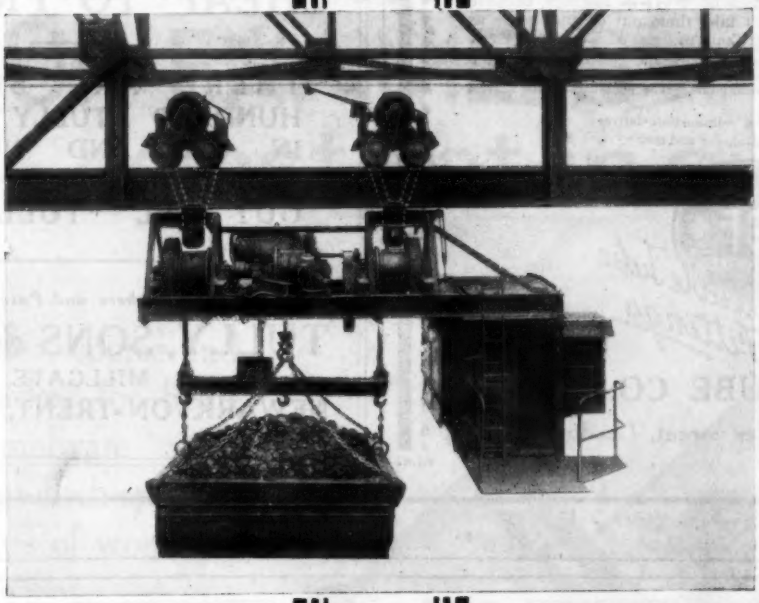
GAS JOURNAL

LIGHT . HEAT . POWER . BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

Vol. 204. 85th Year. LONDON, OCTOBER 18, 1933. No. 3674. Price 1s.

ELECTRIC ALL TYPES | **TELPHERS** ALL CAPACITIES



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For handling Coal, Coke, Oxide, etc., by means of Skips or Grabs.

The illustration shows a 7-Ton Gross Load, three barrel machine for handling coke from Intermittent Vertical Retorts.

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This meter is invaluable to Salesmen for demonstrating the gas consumptions of various appliances such as cookers, fires, boiling burners, etc.

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ECONOMICAL IN USE AND CHEAP TO PRODUCE

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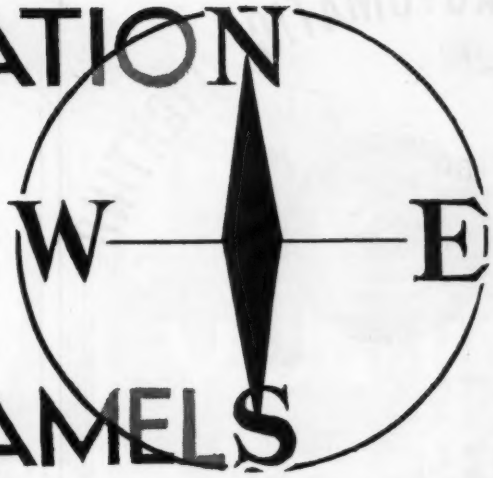

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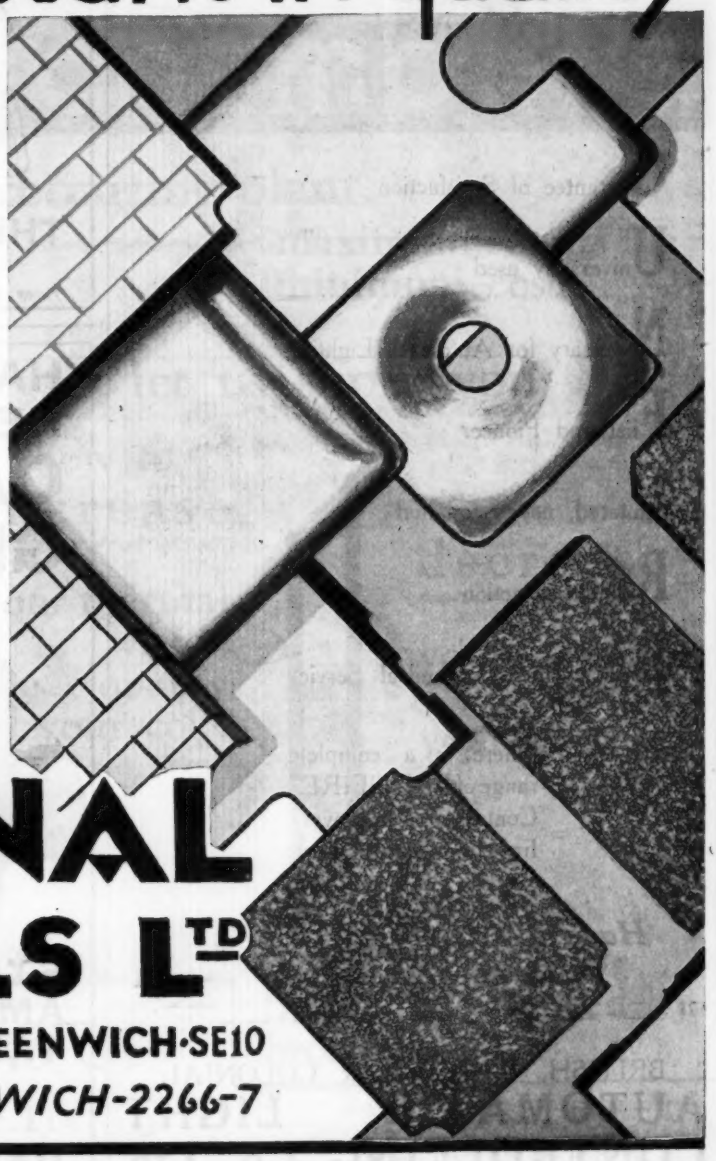
—constant in quality



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PATENT FLEXIBLE JOINT
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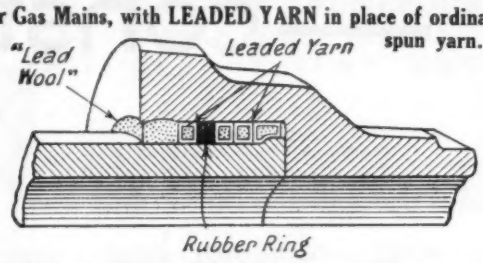

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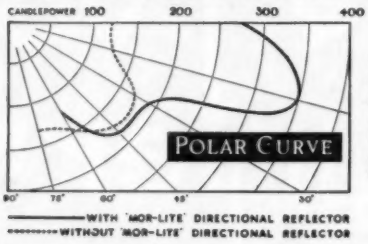
DOES 100% INCREASE IN ILLUMINATION APPEAL TO YOU?

TYPE G LANTERN WITHOUT MOR-LITE REFLECTOR

The Parkinson
MOR-LITE DIRECTIONAL REFLECTOR FOR GAS LIGHTING



The curve shows the Directional Increase in Illumination at no extra cost for Gas

TYPE G LANTERN WITH MOR-LITE REFLECTOR

1. THE "MOR-LITE" DIRECTIONAL REFLECTOR increases the candle power by reflection at low angles where light is most needed.
2. Using a Twin Burner with No.2 medium mantle there is a directional increase from normal 150 c.p. to over 350 c.p. in illumination.
3. Can be fitted in a moment. Can be instantly adjusted both vertically and horizontally to give maximum light service.
4. Wing reflectors can be adjusted by wing nuts to meet every need.
5. Wings lift off instantly for Lamp Cleaning and are replaced without disturbing adjustments.

Send for sample and price list.

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INCORPORATED IN PARKINSON & COWAN (GAS METERS) LTD.

GLENBOIG GAS RETORTS *have been known to..*

STAND 2380 WORKING DAYS

PRACTICAL FACTS GAS MANAGERS WANT TO KNOW

1 The special clay-seam owned and worked exclusively by the Glenboig Union Fireclay Co., Ltd., produces a fireclay peculiarly fitted for the manufacture of Gas Retorts, with advantages not to be found in any other clay.

2 Gas Retorts made with Glenboig Fireclay are capable of resisting greatest heats and most rapid changes of temperature. Glenboig Gas Retorts have been known to stand 2380 working days Nearly seven years.

3 Glenboig apparatus and appliances for the manufacture of retorts is without equal. Every detail is carefully supervised to ensure retorts that can be relied upon implicitly. The leading Gas Works have long used Glenboig Retorts.

4 Glenboig Retorts, Bricks and Blocks, are made in all sizes and patterns to meet all Gas Work requirements. Quotations sent on request. Qualified chemists retained to advise on special requirements.

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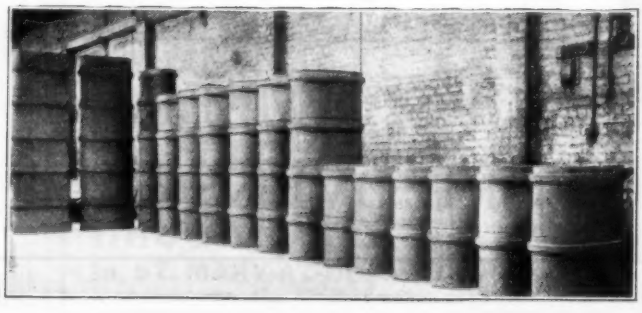

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Display and sell "Eagle" Gas Coke Grates and reap the benefits of increased coke sales. Let your consumers know that coke as a fuel possesses definite advantages over coal — convenience, cleanliness and economy. Graded Gas Coke burned in "Eagle" Grates gives a bright, glowing fire with flickering flames, and in every way preserves the cheerful atmosphere of the fireside.

"Eagle"

GAS COKE GRATES

"Eagle" Gas Coke Grates are available in a number of designs and in either black or coloured enamel finishes. These latter finishes are particularly attractive and have been produced to meet the present-day demand for colour in the home. The colours include Brown, Blue, Green and Mottled Grey. The enamels are durable and easily kept clean with an occasional rub over with a damp cloth.

EAGLE RANGE & GRATE CO., LTD., BIRMINGHAM 6

Radiation
PROPRIETORS

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THE MOORE GAS PLANT

Produces Coal Gas, Water Gas, or Mixed Gas in any desired proportions

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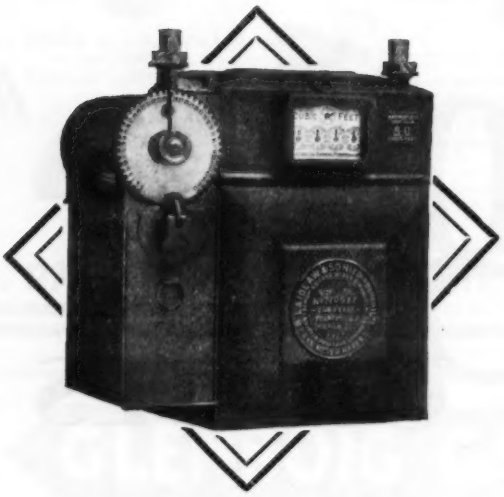

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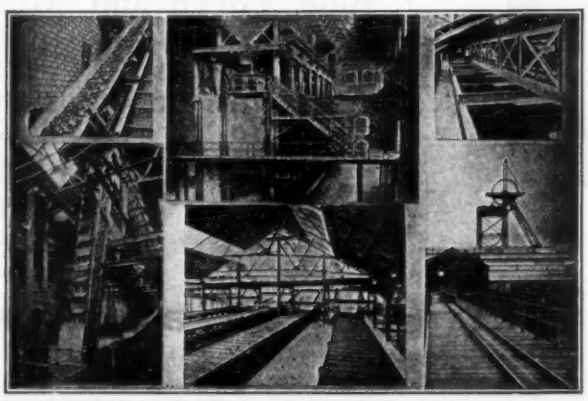

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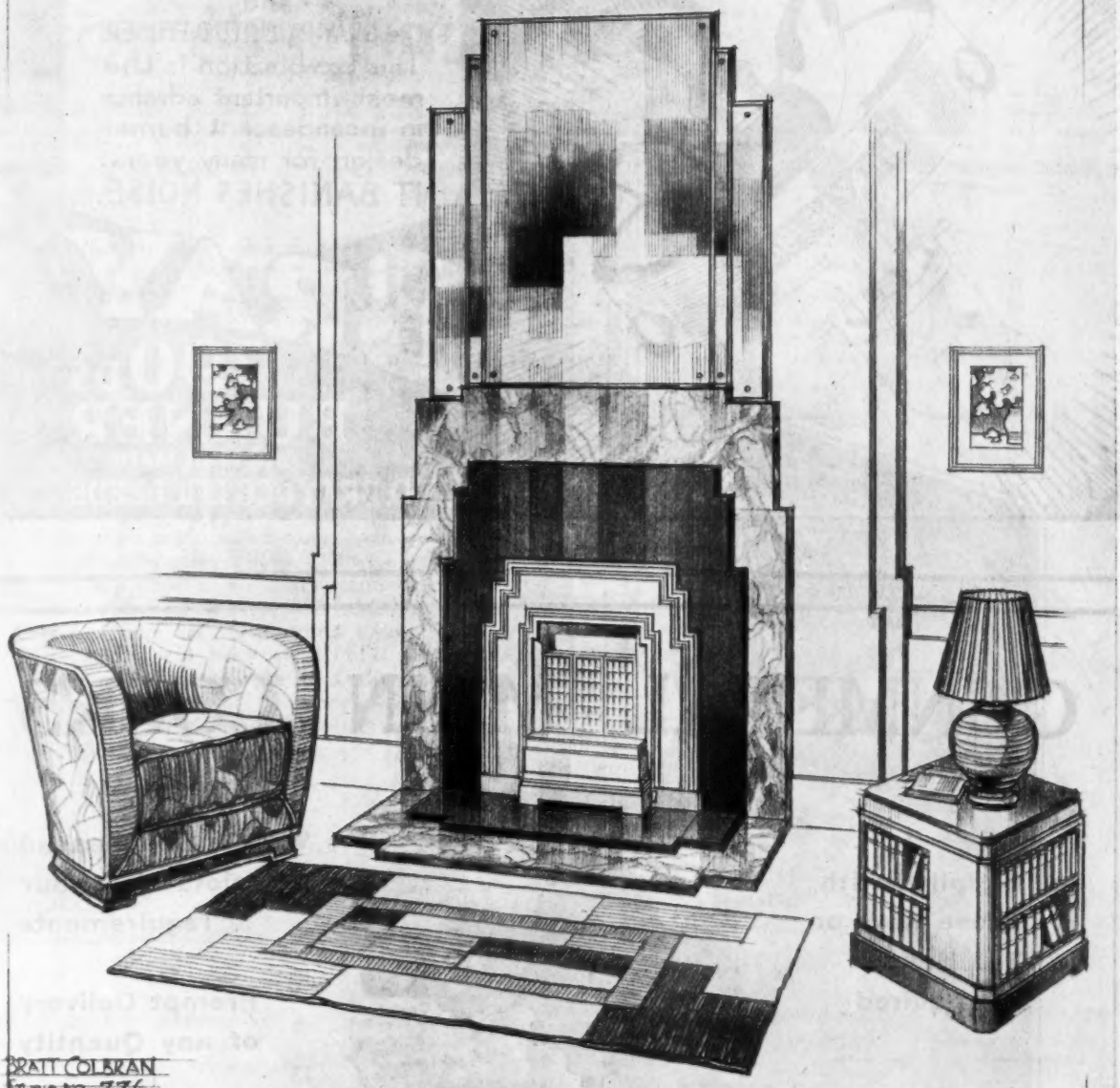
'PORTCULLIS' GAS FIRES

FOR DESIGN & CRAFTSMANSHIP



BRATT COLBRAN & CO. & THE HEAPED FIRE CO. LTD
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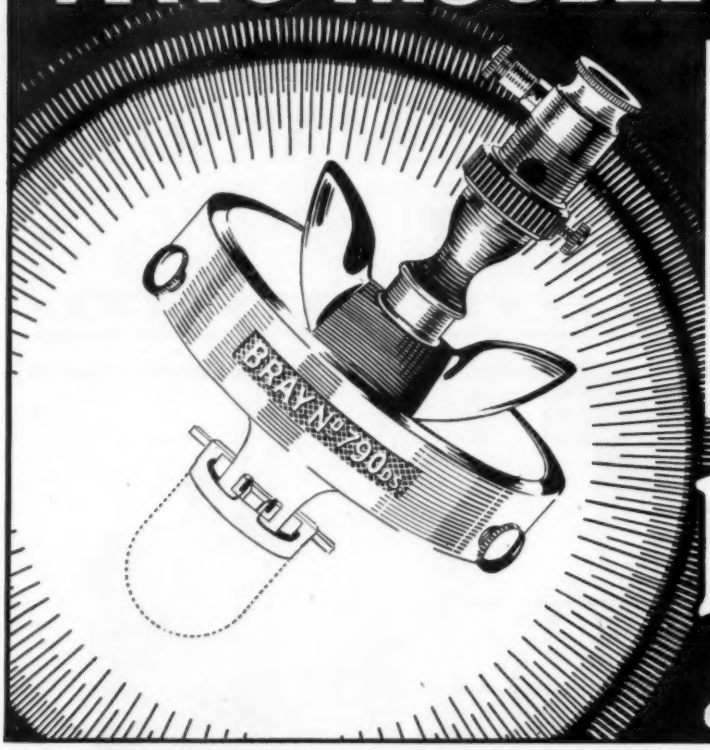
'PORTCULLIS' GAS FIRES

The Gas Industry has enthusiastically welcomed the new high standard of gas fire efficiency introduced by the "Portcullis" series of gas fires.

A NO-TROUBLE BURNER



THE 790 DS. BURNER
is fitted with the
BRAY SILENT REGULATOR
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This combination is the
most important advance
in incandescent burner
design for many years:
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Supplied with
Loose Keys or
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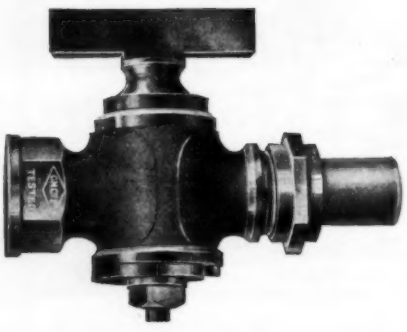

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Prompt Delivery
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SPECIALISE IN THE HIGHEST QUALITY MAIN COCKS

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The days of the Black gas fire are over.

Now a coloured fire is demanded that will harmonise with the rest of the furnishing of the room.

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Write for full particulars of Nobel Heat-Resisting Enamels for Gas Fires to the Industrial Division:—

NOBEL CHEMICAL FINISHES LIMITED
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NOBEL HEAT-RESISTING ENAMELS

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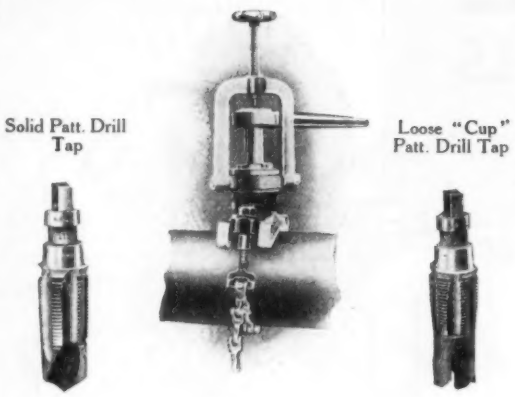

For drilling and tapping mains accurately and quickly with minimum loss of Gas.
They use them **All day and Every day** knowing that better machines and tools are unprocurable.

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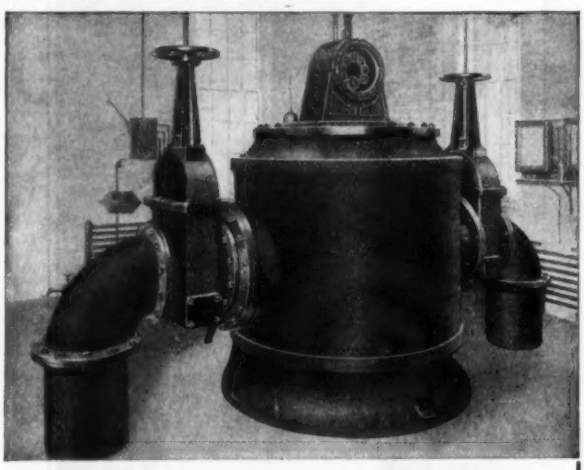

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HAVE A REPUTATION FOR

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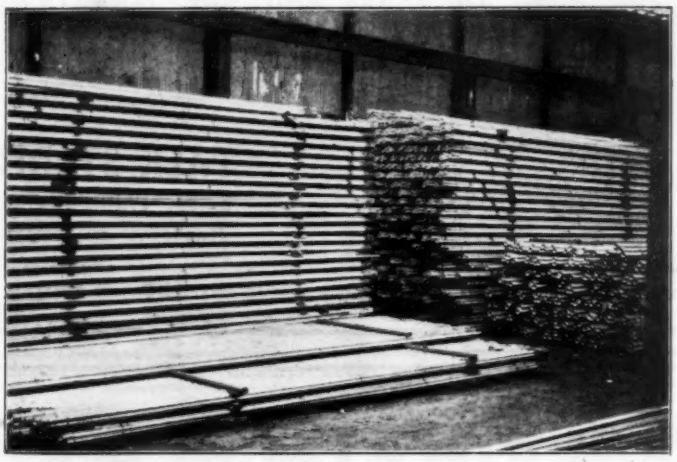

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PLEASE APPLY
FOR
CATALOGUE No. 8.

Fig. 105

Fig. 256

Fig. 267

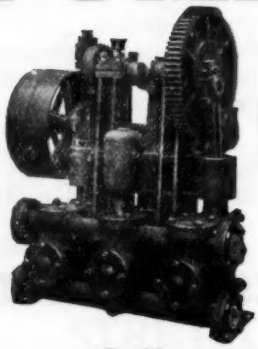
Fig. 242

Fig. 187

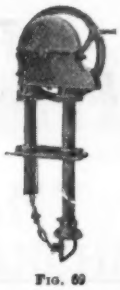
Fig. 69

Fig. 204

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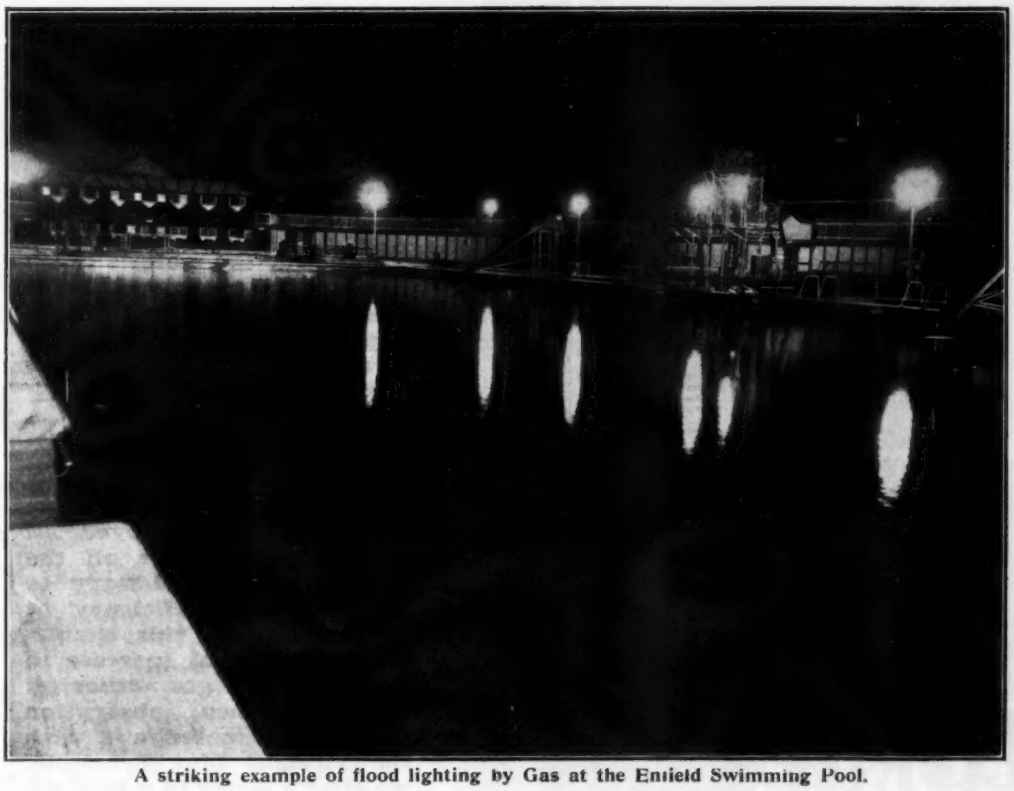
is a

great asset to your outdoor load.

We have specialized in this branch of outdoor lighting, and the benefit of our experience is at your command.



A striking example of flood lighting by Gas at the Enfield Swimming Pool.

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Lamp is something entirely new and attractive.

Maximum intensity 70-80° from the Vertical.

Write for comprehensive brochure.

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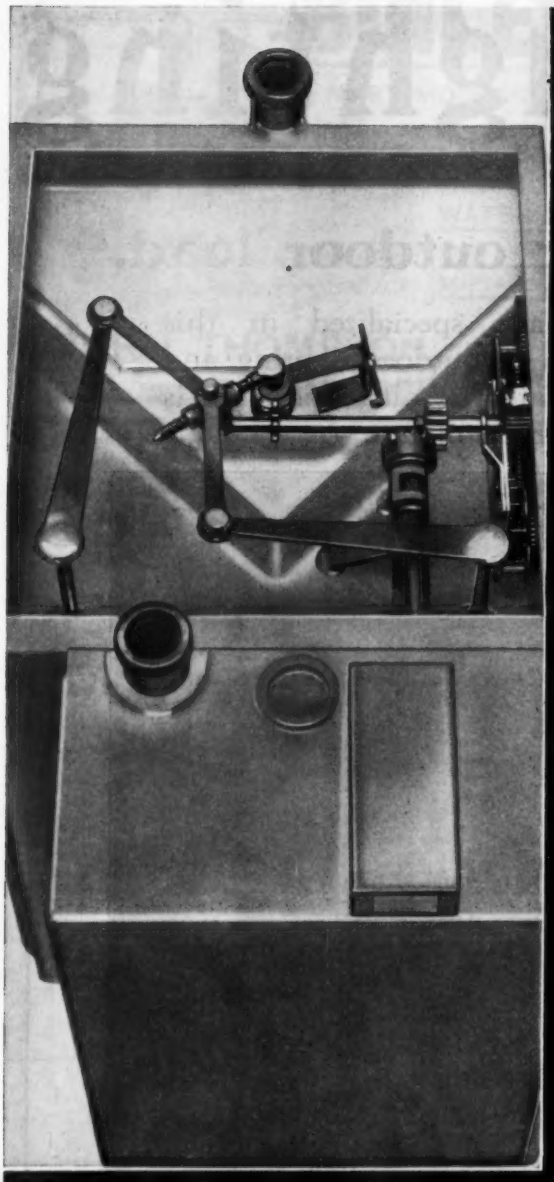


METER VALVES AND METER VALUES

Here we give the third of our reasons for claiming that the Straight Line Meter is the most important production of recent years in the gas meter industry. Our first reason was the elimination of all strain from the diaphragm, our second was the meter's great accuracy in measuring small quantities. Our third reason is printed below. We shall offer no more. These are sufficient to prove the superiority of any meter.

●

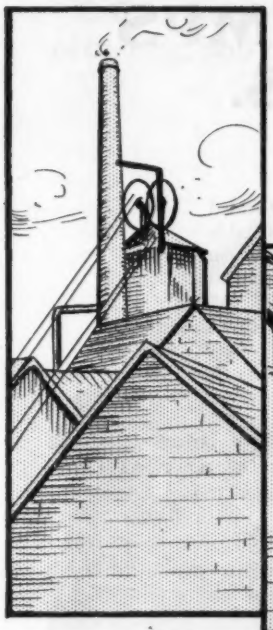
When meters with an undue absorption are employed, an increase of pressure on the town becomes necessary to give the user efficiency at his appliances, this resulting in a general increase in expense to the gas authority. Obviously then, absorption must be eliminated, and with the Straight Line Principle, we offer a meter in which the loss of pressure is less than that in a ten foot line of pipe equal in diameter to the inlet and outlet of the meter employed. Hence the name "Straight Line Meter."

●

These are the advantages of the Straight Line Meter—question us about them, and examine the meter in any way you like. We have every faith in our product.

GEORGE WILSON GAS METERS LTD.

COVENTRY
LONDON
MANCHESTER



FROM
MINE
TO
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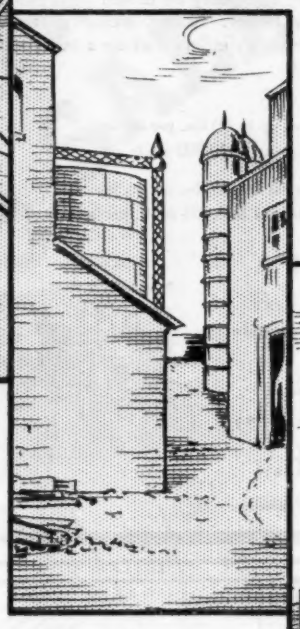

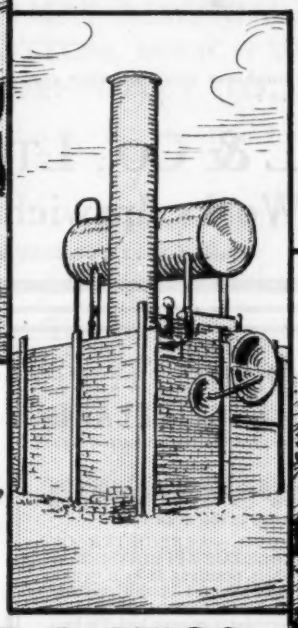

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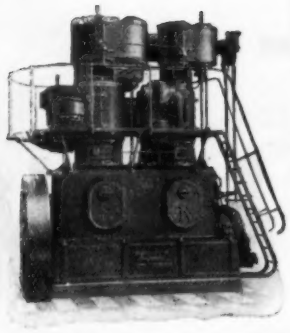

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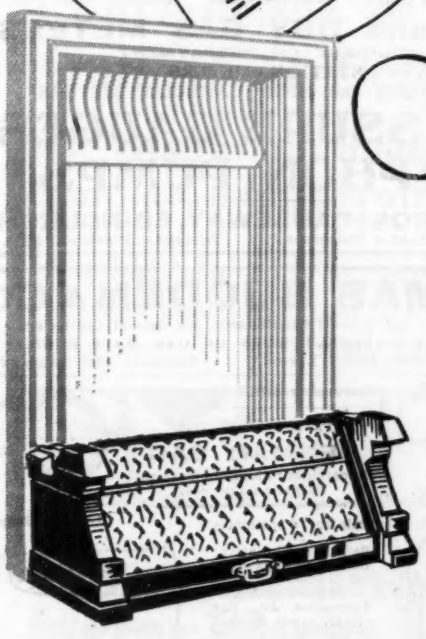

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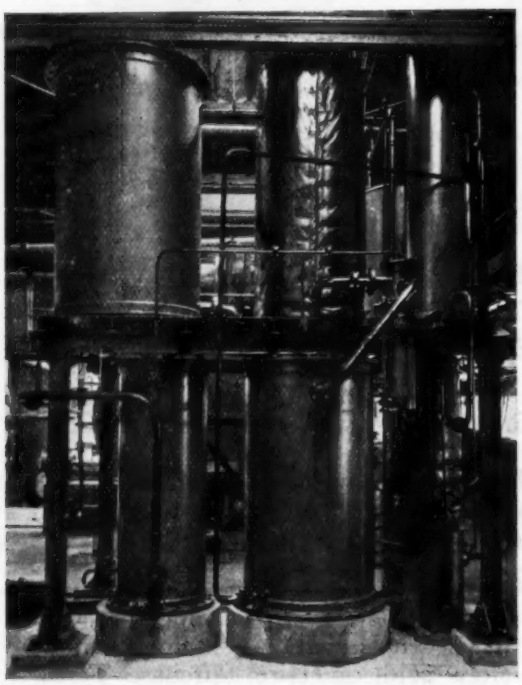

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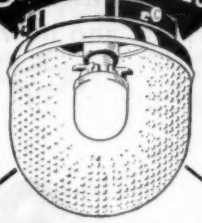

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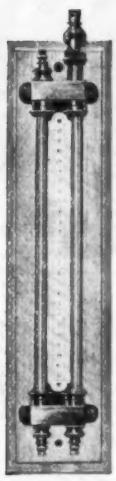

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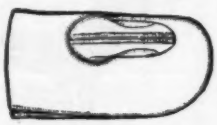

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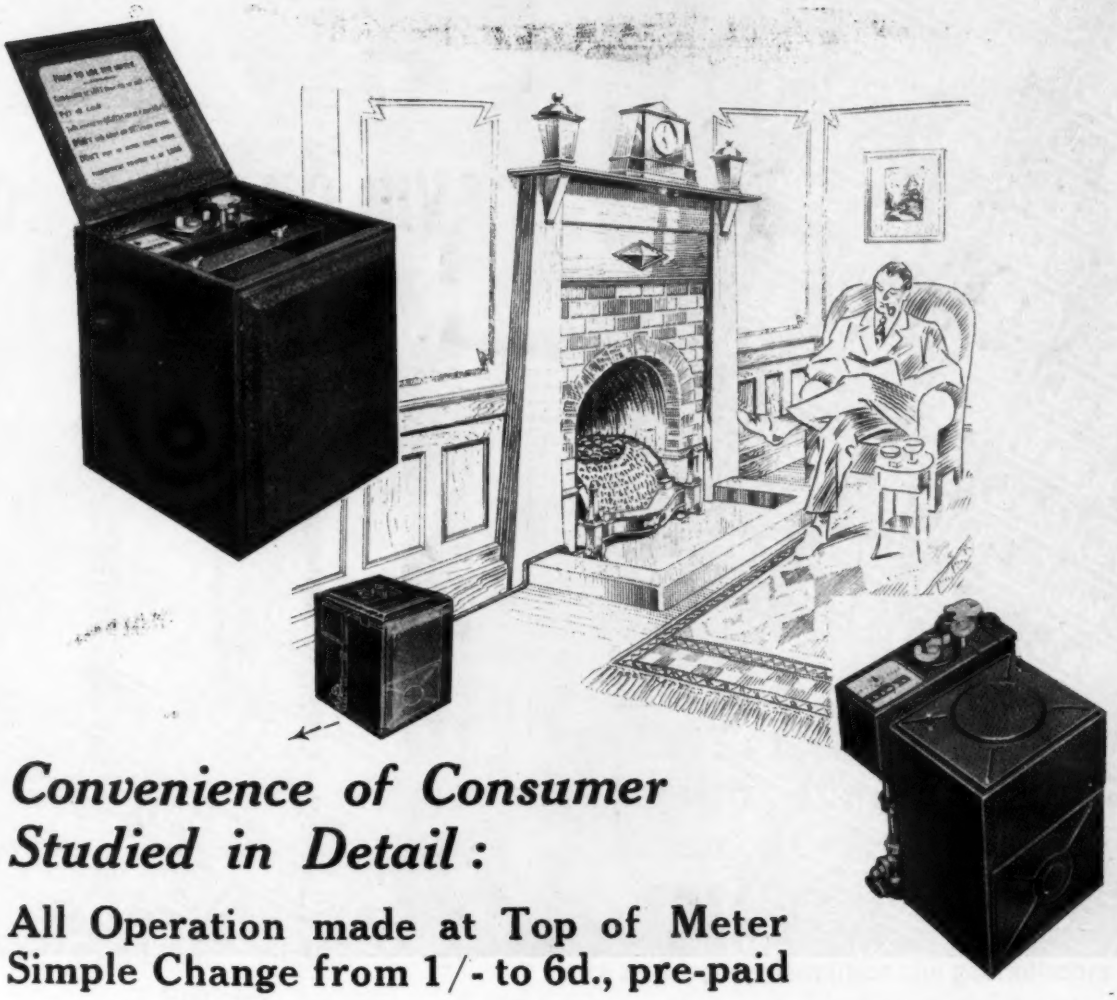

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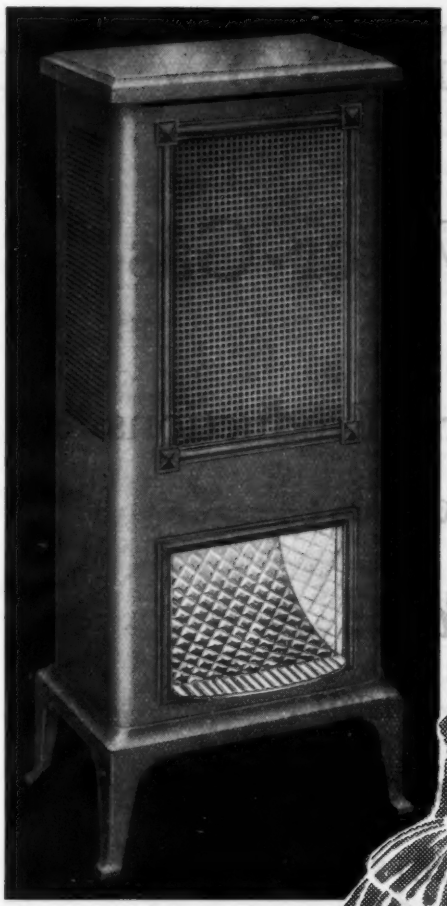

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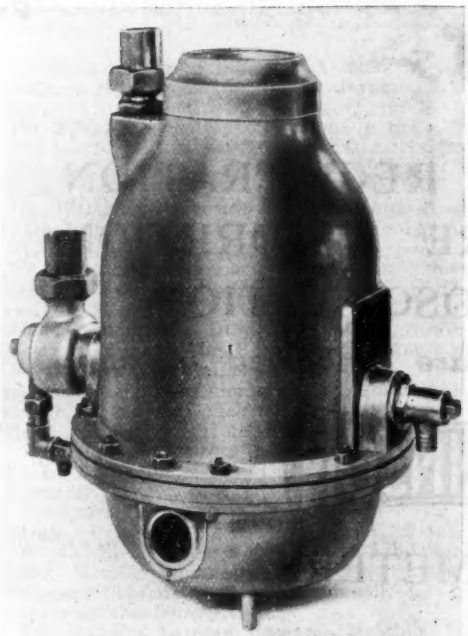
G.J.18.10.33.

LIGHT STRONG CASING



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THE GAS JOURNAL

OCTOBER 18, 1933

Vol. 204. 85th Year No. 3674

A Glance at the Contents—

In America with the Institution.

The Editor continues his story of the Institution Tour to Canada and the United States of America. [p. 194.]

Assistant Fittings Superintendent.

A Gas Company in the West of England invites applications for the post of Assistant Fittings Superintendent, the salary offered being £400 per annum. [p. 226.]

Midland Junior Gas Association.

The opening meeting of the Midland Junior Gas Association was held at Birmingham on Oct. 5, when Mr. S. K. Hawthorn delivered his Presidential Address. [p. 214.]

New Carbonizing Plant at St. Ives.

An installation of Woodall-Duckham continuous vertical retorts was inaugurated at St. Ives (Cornwall) by Mr. Walter Runciman, President of the Board of Trade. [p. 209.]

Assistant Gas Manager Required.

A Scottish Gas Department requires an Assistant Manager. [p. 226.]

Gas at the North London Exhibition.

More space than ever has been secured by the Tottenham and District Gas Company at this year's North London Exhibition at the Alexandra Palace, and a very fine display has been arranged. [p. 211.]

Plant for Small Works.

Gas manufacturing plant for a small works formed the subject of Mr. W. Scott's Presidential Address at the opening meeting of the Scottish Junior Gas Association (Eastern District) at Dunfermline. [p. 217.]

Oil in the World of Fuel.

It is now the fashion to blame oil almost exclusively for the present plight of the coal industry, said Sir John Cadman, G.C.M.G., D.Sc., in the Melchett Lecture delivered at a meeting of the Institute of Fuel. [p. 208.]

Forthcoming Engagements

Oct. 19.—EASTERN COUNTIES GAS MANAGERS' ASSOCIATION.—Autumn Meeting, 28, Grosvenor Gardens, S.W. 1, 2.15 p.m.

Oct. 19.—S.B.G.I.—Meeting of Council in the afternoon.

Oct. 20.—LONDON AND SOUTHERN JUNIOR ASSOCIATION.—Opening Meeting and Presidential Address of Mr. H. C. Sims.

Oct. 21.—WALES AND MONMOUTHSHIRE JUNIOR ASSOCIATION.—Opening Meeting at Cardiff. Presidential Address of Mr. H. S. Bartlett.

Oct. 21.—WESTERN JUNIOR ASSOCIATION.—Meeting at Bristol. Two short papers by Mr. N. F. D. Wardle and Mr. E. Smith.

Oct. 27.—MANCHESTER DISTRICT ASSOCIATION.—General Meeting, Midland Hotel, Manchester, 2.30 p.m.

Oct. 30.—LONDON AND COUNTIES COKE ASSOCIATION.—Meetings of Executive Committee, 11 a.m.; Central Committee, 12 noon; Luncheon, 1 p.m.; Annual General Meeting, 2.30 p.m., Hotel Metropole, S.W. 1.

Nov. 2.—MIDLAND JUNIOR ASSOCIATION.—Paper by Mr. F. L. Atkin on "The Design of Town Gas Fired Furnaces."

Nov. 4.—SCOTTISH EASTERN JUNIORS.—Meeting at Edinburgh. Paper on "Automatic C.W.G. Plant."

Nov. 6.—I.G.E.—Meetings of Finance Sub-Committee, 2 p.m.; Membership Sub-Committee, 2 p.m.; General Purposes Committee, 3 p.m.; Council, 4.15 p.m., 28, Grosvenor Gardens, S.W. 1.

Nov. 7-8.—I.G.E.—Autumn Research Meeting, Institution of Mechanical Engineers.

Nov. 9.—S.B.G.I.—Autumn General Meeting, Hotel Metropole, London.

Nov. 14.—I.G.E.—Session at the Public Works, Roads, and Transport Congress and Exhibition, Royal Agricultural Hall, 11 a.m.; Joint Session of the Institution and the Association of Public Lighting Engineers, 3 p.m.

Nov. 14.—I.G.E.—Meeting of Gas Education Committee, 5 p.m., 28, Grosvenor Gardens, S.W. 1.

Nov. 15.—SOUTHERN ASSOCIATION.—General Meeting, Hotel Metropole, London, at 2.15 p.m.

Nov. 17.—LONDON AND SOUTHERN JUNIOR ASSOCIATION.—Annual Dinner and Dance, Empire Restaurant, S.W. 1.

Nov. 25.—NORTH OF ENGLAND AUXILIARY ASSOCIATION.—Half-yearly Meeting at Newcastle. Paper by Dr. G. P. Lishman, F.I.C.

Nov. 25.—WESTERN JUNIOR ASSOCIATION.—Meeting at Bath. Paper by Mr. G. K. Rose.

Dec. 11.—I.G.E.—Meetings of Finance Sub-Committee, 2 p.m.; Membership Sub-Committee, 2 p.m.; General Purposes Committee, 3 p.m.; Benevolent Fund Committee of Management, 4.30 p.m., 28, Grosvenor Gardens, S.W. 1.

Dec. 12.—I.G.E.—Meetings of Council, 10 a.m.; Gas Education Executive Committee, 4 p.m., 28, Grosvenor Gardens, S.W. 1.

Dec. 21.—I.G.E.—Meeting of Refractory Materials Joint Sub-Committee, 2.30 p.m., 28, Grosvenor Gardens, S.W. 1.

1933 "JOURNAL" Directory.

Page 8. BISHOP'S STORTFORD. F. H. Robinson appointed E. and M. vice W. C. Kimpster.

Page 10. BRIGHTON. C. H. Rutter, Chief Engineer; P. E. Browne appointed G.M.

Page 30. HARROGATE. F. H. Robinson, E. and M., resigned.

Page 84. FORRES. J. Storrier appointed E. and M. vice W. M. Williamson.

EDITORIAL NOTES

Continuous Verticals in Small Works

IN the Gas Industry efficient manufacture is by no means limited to works of large or even medium size. It is one of the peculiar and also one of the most pleasing characteristics of the manufacture of gas that the small works are able to take advantage of modern improvement in gas engineering almost side by side with its larger relations. It is therefore with particular pleasure that we publish in this issue of the "JOURNAL" a description of the official inauguration on Oct. 11, by the President of the Board of Trade, of a new carbonizing plant at the works of the St. Ives Gas Department in Cornwall. The problem facing Mr. Grant, the Engineer and Manager of the Department, presented several interesting features. His annual make of gas, though increasing every year, is definitely small at 37½ millions. He serves a seaside resort with a short summer season, and the wide and sudden fluctuations in population and consequent demand for gas mean that he must have a manufacturing plant which is very flexible in output. His works are situated immediately adjacent to one of the favourite bathing beaches of the district, and his plant must therefore not interfere with the amenities of that beach more than can possibly be helped. To meet these requirements Mr. Grant recommended the Gas Committee to adopt the continuous vertical retort system.

The plant just inaugurated consists of three Woodall-Duckham continuous vertical retorts of the upwardly heated 44-in. type, set in single line and heated by two independent step-grate producers. These retorts are, of course, smokeless in operation and are so flexible in output that, though their maximum capacity is only 252,000 c.ft. of gas a day, no difficulty has been experienced in meeting very closely the fluctuations in demand which have occurred in the nine months during which they have been at work. A feature of the plant which is worthy of special mention is the provision of horizontal natural-draught waste-heat boiler of special design for use in conjunction with carbonizing plants of this scale. This boiler supplies the whole steam requirements of the plant, and, in order that it may give its full output irrespective of the number of retorts in operation, arrangements have been made whereby a supplementary supply of producer gas may be mixed with the waste gases from the retorts before they are passed to the boiler. A considerable saving in manufacturing costs was anticipated as the result of the new installation even when allowance had been made for the interest and sinking fund charges on the capital outlay. The indications are clear that this saving will be effected and in addition the Committee have found it possible to offer their consumers a price reduction of 5d. per 1000 c.ft. Mr. Grant has gone further than this. His new carbonizing plant produces a superior coke, and he has installed a screening plant to prepare this coke for sale. By thus encouraging the wider use of coke in his area he has made another important contribution to preserving the pure atmosphere which is so important to a seaside resort.

Further interest is added to the inauguration of this new installation at St. Ives by the fact that a modernization scheme on works of a somewhat similar scale was inaugurated on Sept. 21 at Porthcawl, in South Wales. The Porthcawl Undertaking has an annual make of about 46½ million c.ft., and as it is also a popular seaside resort it presents very similar problems to those which have to be faced at St. Ives. Here again the choice of carbonizing plant fell upon the continuous vertical retort. The plant, which was fully described in the "JOURNAL" of Sept. 27, comprises three Glover-West 50-in. New Model retorts also set in single line and heated by two independent step-grate producers. Particular care was taken to secure a pleasing exterior to the plant, and similar satisfaction has been expressed with the efficacy of the installation in meeting the peculiar requirements of a seaside town, while contributing to the preservation of the local amenities.

The Importance of Being Small—and Progressive

WE perhaps may regard from an even wider aspect these latest examples of progressive effort in small works. When it is realized that approximately one-thirteenth of the gas produced in the United Kingdom is made in works with a yearly output of less than 100 million c.ft., the prevailing tendency towards modernization of these works and adaptation to their use of the latest methods of manufacture takes on a considerable significance.

The completion of the electrical "grid" has finally committed future electrical development in this country to the super-power station as the typical production unit. That may be, on the whole, for better, or it may be for worse. On our part we venture to suggest that it may often in the long-run militate against the most economic utilization of the potential sources of electrical power. No doubt the super-power station is technically the most efficient manufacturing unit, but the problem of distribution on economic lines and the creation of a market in rural areas are factors in the ultimate success of the central electricity scheme which have yet to be solved. Also, the scheme, with its huge centralized stations, will in many cases prevent the adoption of cheap localized sources of fuel.

It may yet be a considerable factor in the future of the Gas Industry that the small localized plant can afford almost as efficient and economical production as the large centralized unit serving a thickly populated area.

The Time of Test

AT the same time it would be foolish to disregard the necessity of meeting the next stage in the development of the electricity scheme. There is no doubt that, with its instrument completed, the electrical industry is "going out to get the business." Even a cursory examination of the recent report of the Central Electricity Board reveals that they realize that their work has only reached the end of its first stage, and that the spectacular engineering achievement which has been brought into being must be backed up by keen salesmanship. Whatever our individual opinions may be of its ultimate success and justification, the time of testing is at hand. It is up to all sections of the Gas Industry to make every effort to ensure that gas stands on its merits. Whether it be by devising some form of centralized financial control or by localized gas grids (for the nation-wide gas grid has not won the favour of those with authority to speak); whether it is by modernization of works and distributing systems to secure the maximum efficiency and the best service; whether it is by working for the introduction of scientific methods of charging for gas; or whether it is by keen salesmanship, prompt and courteous service to the consumer, and unrelaxed research and propaganda to extend the thousand-and-one uses of gas, everyone in the Industry has a contribution to make towards ensuring that we are not weighed in the balance and found wanting. Let these words not be taken as a sign of lack of confidence in the future, for the Industry is well founded, and has, especially during the post-war years, in its unspectacular way been showing its faith in itself by improvements in every branch of its activities.

Recognition

In connection with the opening of the new plant at St. Ives, we are glad that the President of the Board of Trade is so appreciative of the services which the Gas Industry is able to offer at the present time, and of the extent to which these services are likely to be extended when legislation governing the Industry is amended to meet modern requirements. "The tendency of our day," he said, "has been to go ahead with the development of electricity, at enormous expense, great enthusiasm, and a degree of faith we hope the future will justify. But do not let it be supposed because electricity has gone ahead that has placed gas at a great disadvantage. . . . There is a place for both. I need only mention the prominent part gas plays in the heating of a house and cooking. . . . We ought not to lose sight of the effect on coal and of all that is hidden in coal. I do not think there have been more successful economies made than in the production of gas."

Further recognition of the importance of the Gas Industry is displayed by Sir John Cadman in the Melchett Lecture which he delivered at a meeting of the Institute of Fuel and other Societies last week, an extract from which is published in the "Journal" to-day. "It is my firm opinion," he observes, "that the future of the coal industry will come to depend more and more on a progressively greater adaptation of science to the problem of its transformation into power. There are certain fields which coal as a solid can never hope to reconquer, but science increasingly applied to coal may enable it to rise—a new Phœnix—from the ashes of its own more economical combustion, and seek its salvation in fresh fields and pastures new." Sir John Cadman describes the Gas Industry as—within its limits—one of the most important and technically efficient industries in Great Britain. These limits are imposed by out-of-date legislation which prevents the Industry from exploiting the full potentialities of the fuel which it produces. "I look forward to the day," he remarks, "when the many restrictions which hamper the Gas Industry will be removed and it will be in a better position to secure the advantages to which it is intrinsically entitled. A time will come, I think, when this country will be served with a limited gas grid, as it now is with an electricity grid, and when our annual consumption of coal gas will be many times its present figure. . . . At the moment, however, the gasification of coal does not bulk largely in the public mind, which is more concerned with the novel and well-advertised prospects of hydrogenation. That it should be so is, I think, little short of a calamity."

Sir John points out that, with carbonization—which, of course, is only a partial transformation from solid to fluid—the loss of energy amounts to approximately 20% of that contained in the material treated and consumed. In hydrogenation, however, the loss amounts to over 60% and the object achieved—unlike that obtained by gasification—is the production merely of a substance which, at the present time, Nature itself is yielding in plethoric quantity. To judge by scientific standards, such a transformation is unnecessary and wasteful. Concluding his lecture, Sir John says: The world's reserves of fuel—whether that fuel be oil or coal—are limited, even though their full extent remains yet unknown. It is therefore to our interest, and to that of posterity, that each fuel should be made to yield the maximum amount of energy which human ingenuity can extract from it.

Coal Tar Oils for Motor Engines

In last week's issue we published the announcement that the General Research Committee of the Institution of Gas Engineers had asked Dr. E. W. Smith to prepare a comprehensive review on the results obtained and the work in progress relating to the use of coal tar oils as fuel for internal combustion engines with magneto or coil ignition. The Research Committee indicated that before proper consideration could be given to this subject it was necessary to collate the work done by a number of gas undertakings and other bodies. In the present issue of the "Journal" we include a letter from Dr. Smith pointing out that it is impossible for any one man to be completely in touch with all that is going on in the above connection. Dr. Smith adds that it would be of considerable assistance to him in the preparation of his review if any who have carried out work on the subject would get in touch with him. We feel that the Institution is following a wise course in obtaining a review of existing knowledge before coming to any decision on the subject or before instituting any investigation programme. Too often at the present day is money wasted by parallel research programmes and by work undertaken without full examination of published literature. We are therefore glad to see this circumspect attitude of the Research Committee. If by appropriate treatment coal tar oils can be accepted as suitable fuel for internal combustion engines, particularly those with magneto or coil ignition, it should be a further important outlet for tar products. We hope that those of our readers who have information on this subject will communicate with Dr. Smith in order that his review may be as complete as possible.

Carbonization—The Scope for Development

"While agreeing that the sales side of our Industry is most vital and does not yet receive sufficient attention, it must be conceded that manufacturing methods have certainly not reached that stage of finality at which they can be left out of the programme for the future progress of the Gas Industry." Around these words Mr. S. K. Hawthorn, of the Birmingham Gas Department, delivered a clear, thoughtful, and refreshing Presidential Address to the Midland Junior Gas Association. This address, which will be found on later pages of this issue, should serve as an encouragement and an incentive to those who are engaged in gas production.

Mr. Hawthorn considers that the future success of the Industry depends upon two factors—one the business of the engineer and chemist and the other that of the salesman. His Address is mainly devoted to the first factor. He considers that it is the business of the engineer and chemist so to improve methods of manufacture that the cost of producing gaseous therms is reduced, whilst at the same time making more acceptable residuals. He sets out to consider the present position of carbonization and to indicate in what directions improvements in carbonization may be found. He points out that, although gas manufacturing costs have been reduced in the last twenty years by mechanical improvements, better materials of construction, increased throughputs of carbonizing plant, reduction in arduous labour, and improved technical supervision in every way, yet the actual production of straight coal gas therms per ton of coal has shown very little improvement. Gas making efficiency expressed as the percentage recovery of straight coal gas therms in relation to total volatile therms has improved very little during the last fifty years. He points out that the only real developments in high-temperature retorting practice have been, first, the introduction of higher grade refractories permitting higher working temperatures and shorter carbonizing times, and, secondly, the simultaneous or alternate production of coal gas and blue water gas in continuous or intermittent vertical retorts.

The extent to which dilution by coal gas can be carried out when making gas of a given declared calorific value depends upon the calorific value of the straight coal gas made. It is therefore obvious that where dilution of straight coal gas with blue water gas is found profitable, the aim should be towards high calorific value of the coal gas in addition to high thermal yield per ton. In Mr. Hawthorn's view the make of therms of the enriching hydrocarbons and the calorific value thereof is the true index to gas making efficiency, and in this direction lie possibilities of improvement. A high thermal yield of hydrocarbons in coal gas appears to depend upon correct heat treatment of the tarry vapours, it being necessary to maintain a balance between "over-cracking" and "under-cracking."

Controlled Cracking

HAVING expounded this general idea of controlled cracking of the hydrocarbon vapours, Mr. Hawthorn proceeds to examine the conditions in existing forms of carbonizing plant. In his view none of the standard plants as designed to-day seem to meet the necessary requirements. Carbonizing conditions in an intermittently charged retort, either horizontal or vertical, change gradually from initial conditions of under-cracking, through a stage of adequate cracking, to later conditions of excessive degradation. Continuous vertical retorts suffer from under-cracking of the gas, as may be shown by the lower thermal yield of straight gas compared with that from intermittent carbonization.

The author considers that in spite of the fact that intermittent carbonizing conditions cause more degradation than would be ideal, the thermal yield per ton clearly indicates that intermittent retorts err less on the side of over-cracking than do continuous verticals on the side of incomplete cracking of tarry vapours He states that for any given calorific value, horizontals *plus* outside blue water gas will give higher therms per ton than steamed continuous verticals carbonizing the same coal. Mr. Hawthorn is, however, quick to state that this must not be taken as a condemnation of continuous verticals because "gas manufacture must be judged from its economic aspect, and therefore high thermal yields obtained at high cost may not be able to compete with lower thermal yields derived from a more logical process by which coal feeding and quenched coke extraction are continuous and simultaneous." Coming from one of the strongholds of vertical carbonization, it is interesting to read the comment that "when such items as labour costs, working conditions, absence of smoke and steam, flexibility of gas volume and calorific value, ease of blue water gas addition, and coke quality for certain purposes, are taken into consideration continuous verticals must command the most serious consideration in almost every contemplation of new gas-works carbonizing plant." But Mr. Hawthorn evidently does not think the last word has yet been said, for he adds, "Nevertheless it should be possible so to improve carbonizing methods that a plant giving every practical advantage in working should also return the highest possible yield of straight coal gas therms." What is needed is more control of the cracking of the vapours evolved during carbonization—a fact well known and emphasized by other workers.

In his concluding sentences Mr. Hawthorn urges that further emphasis should also be laid on coke quality, and suggests that consideration should be given to the production of a fuel heavier than coke which will burn readily and smokelessly in any grate which will burn raw coal. This new fuel would require a name general in application and yet bearing no resemblance to the word "coke." He adds that the Gas Industry has something to learn from low-temperature carbonization in the more uniform treatment of coal. "It may well be that low-temperature carbonization will eventually find a place on economic grounds in town gas manufacture."

On this note Mr. Hawthorn leaves the subject, suggesting that he has said sufficient to justify his statement at the outset of his address, namely, that carbonization methods have not reached finality and that there is ample scope for progress in the future. With this we are in entire agreement. It is necessary to keep in the forefront of our minds the fact that finality in scientific development is never reached. It is to the young men of the Industry that we look to uproot our preconceived ideas and to lead the Industry to new fields.

PERSONAL

OFFICIAL CHANGES AT BRIGHTON.

The September issue of the *Co-Partnership Magazine* of the Brighton, Hove, and Worthing Gas Company gives a résumé of the proceedings which marked the retirement of Mr. C. H. RUTTER from the post of General Manager of the Company—he remains as Chief Engineer—and the introduction of Mr. P. E. Browne as his successor.

Mr. Rutter, reviewing his association with the Company, said he joined Mr. Joseph Cash as an articled pupil in 1886. After completing his articles in 1890 and being appointed on Mr. Cash's staff as Engineering Assistant, the next milestone in his life was in 1897 when he took up the post of Engineer and General Manager of the North Middlesex Gas Company, with whom he remained for five years. He returned to the Brighton Company in 1902 as Assistant Engineer at Portslade. The next date referred to by Mr. Rutter was 1915, when he became Engineer and General Manager on the retirement of Mr. Cash. He quoted figures showing how the sale of gas, the capital of the Company, and the number of employees, had increased during the 47 years with which he had been associated with the Company, and how the work had necessarily increased year by year. Mr. Rutter went on to say that on these facts being brought to the notice of the Board of Directors they had agreed to his retirement from the General Managership, and at his own request he was to continue in his present position as Chief Engineer of the Company. This would give him the opportunity of concentrating more on the engineering side, and devoting more time to that important department.

Mr. Hyde C. Burton, Secretary to the Company, pointed out that the name of Rutter had been connected with the Company for practically one hundred years, Mr. Rutter's grandfather being the Engineer of the Black Rock Works. Mr. Burton expressed the hope that Mr. Rutter would now be able to enjoy more leisure, and facilities for recreation.

Mr. Rutter then formally introduced Mr. P. E. BROWNE as his successor, and referred to his long experience with the Company, and his previous experience with the South Metropolitan Gas Company which he brought to his new office as General Manager. Mr. Rutter expressed the hope that the staff would give to Mr. Browne the same loyalty and service which they had given to him for so many years.

* * *

Mr. JAMES STORRIER, chief technical assistant to the Dundee Gas Department, has been appointed Engineer and Manager to the Forres Gas Light Company. There were 75 applicants. Mr. Storrier, who has been eleven years in Dundee, is an Associate Member of the Institution of Gas Engineers. During the war he served with the Royal Air Force.

* * *

Mr. F. H. ROBINSON, Assoc.M.Inst.C.E., of Harrogate, has been appointed Engineer and Manager of the Bishop's Stortford, Harlow, and Epping Gas and Electricity Company, and will be taking up his duties there very shortly.

* * *

At the annual luncheon of the Widnes Chamber of Commerce on Oct. 3 Sir GEORGE CHRISTOPHER CLAYTON, M.P., was presented with an illuminated address congratulating him on the knighthood conferred upon him this year. Sir Christopher, who is Chairman of the Liverpool Gas Company, is the President of the Institute of Chemistry and a Director of Imperial Chemical Industries, Ltd., and speakers at the luncheon paid tribute to the important part played by him in the development of chemical industry in this country, particularly in Widnes.

OBITUARY

MR. F. W. CROSS.

The death took place suddenly, at the age of 72, as a result of heart failure, at his home at Loughton, Essex, on Oct. 14, of Mr. Frederick William Cross, M.Inst.C.E., who was for 34 years with the Lea Bridge District Gas Company.

Mr. Cross held appointments at Newport, Hong Kong, and Wellington (Salop) before his appointment as Engineer and General Manager to the Lea Bridge Company in 1896. He relinquished the post of Engineer in 1926, but remained General Manager until the end of 1929, when he retired and was given a seat on the Board of Directors as a mark of appreciation of his services. Some idea of the progress of the Company under the control of Mr. Cross may be gained from the fact that during the 34 years he was at its head the output of gas increased from 90 million to 1000 million c.ft. per annum.

During the latter part of his life Mr. Cross took a very keen interest in welfare work generally, being for 19 years Hon. Treasurer of the Walthamstow Voluntary Child Welfare Society. The funeral takes place to-day at St. Mary's Parish Church, Walthamstow.

CORRESPONDENCE

Coal Utilization Council.

SIR,—I am much interested in your Editorial Notes of this week's issue of the "JOURNAL," referring to the advisability, or otherwise, of supporting, to some extent, the efforts of the Coal Utilization Council.

The C.U.C. recently addressed a letter to all City Engineers and Borough Surveyors, which, apart from the question of the method of heating, ably drew attention to the all-important and vital question of ventilation. Steps were taken in Leeds to see that this letter came to the notice not only of our City Engineer, but of all members of our Improvements Committee, and they tabled a minute which enabled me to offer the following words of congratulation to the City Council:

> I want to refer to the Minute which resolves that the Coal Utilization Council be informed that this Council has not erected any houses of the types indicated.
>
> It is, I think, desirable that the Council should be told that the types indicated are houses either without flues of any kind, or flues of such construction that they preclude the use of solid fuel.
>
> It is perfectly true that the object of the letter from the Coal Utilization Council is to ensure that, in the future, the people may have free choice in the matter of what fuel they burn, but the point I want to make is that this Council is to be congratulated that it is adopting the policy of seeing that Corporation houses are provided with adequate flues. After all, we now insist that our good friend the cow has a skylight in her mistal; we should give even more attention to the ventilation of the homes of our people. Apart from any question of the method of heating, which obviously should be one for the occupier of the house to settle, there is the far more important question of ventilation, and the household chimney has many times been referred to as the most important means of ventilation in the average home, which, without the substitution of adequate flues, is bound to be opposed by all those interested in public health, and I am hoping that this Council, through its Improvements Committee, will continue the policy indicated in this Minute, having realized that it is essential first of all to safeguard the people in the matter of ventilation, after which they can select their own method of heating.

With the modern gas fire we provide not only heat scientifically, but first-class ventilation, when properly installed in conjunction with a proper flue. I, for one, would like to see the Gas Industry go forward with the C.U.C. in helping the people to obtain first-class ventilation. This is the time to do so, in view of the national slum clearance and re-housing programmes.

Trouble, in the form of smoke at the chimney top, is of little concern to most householders. It only affects the man next door, and only legislation to bring about the abatement of smoke will alter this state of affairs. But trouble in the householder's own grate is a different problem, and one which he will eventually settle for himself by making use of modern scientific heating and ventilating appliances.

Throughout the Gas Industry there is a determination to offer gas, when taken in quantity, at better prices—a movement which the promised revision of Gas Legislation will certainly accelerate.

Therefore, I hope we shall strongly support the C.U.C. in their endeavour to get flues in every room in every house, and the rest of the problem must surely be left to good salesmanship and more up-to-date methods of charge.

Yours, &c.,
GEOFFERY H. KITSON.

Monk Bridge Iron Works,
Leeds,
Oct. 13, 1933.

SIR,—With reference to your edition dated Oct. 11, I note you state that "those who read the report will recall perhaps with some astonishment, the exhortation of Mr. C. S. Shapley at the Bournemouth Conference . . ."

I do not in any way retract what I said at the Bournemouth Conference; the only thing I am afraid of is that either I did not make myself clear, or that I have been misreported. I intended to convey to the meeting, that inasfar as the Coal Utilization Council were going to press for flues in *all* rooms, I hoped we should whole-heartedly support them.

The incidence of this support is, I think, obvious from a ventilation point of view. I hope one day we shall see the Minister of Health, in conjunction with the Minister of Mines, bringing forth legislation prohibiting the use of raw coal as a means of domestic heating; and when this comes to pass we shall have gas, electricity, and smokeless fuel as the order of the day.

Gas and electricity will be so cheap as a result of this general application that we shall see vistas over the large cities which have not been seen since the coal strike of 1926, while the community will benefit in health for all time.

Yours, &c.,
C. S. SHAPLEY,
Engineer and General Manager.

City of Leeds Gas Department,
Market Hall, Leeds,
Oct. 13, 1933.

Coal Tar Oils for Motor Engines.

SIR,—In a recent issue you published the fact that I had been requested by the General Research Committee of the Institution of Gas Engineers to prepare a review of the work that had been done in connection with the use of Coal Tar Oils as Fuel for Internal Combustion Engines with Magneto or Coil Ignition.

It is impossible for any one man to be completely in touch with all that is going on in the above connection, and it would be of considerable assistance to me in the preparation of this review if any of your readers who have carried out work on the above subject would get into communication with me.

I am particularly desirous that the review should be as comprehensive as possible, and that no useful work should be overlooked.

Yours, &c.,
E. W. SMITH.

136-150, *Victoria Street,*
London, S.W. 1,
Oct. 13, 1933.

Women and Propaganda.

SIR,—Many times in the past few years nebulous proposals have been put forward for the formation of a Woman's Gas Association to offset the effects of the Electrical Association for Women. I disagree with such proposals on two counts. In the first place I think it is defeatest strategy to copy the methods of your competitor. In the second place, I very much doubt whether any genuine results come from the subsidizing and bolstering up of a new Association which, drawing its vitality from outside instead of from the voluntary efforts of the members, can only succeed in attracting butterflies and busybodies who have nothing better to do than to attend social occasions and hear each other talk at teafights. So I am sceptical when I hear a gas manager talk about the need for a new Women's Association. I always want to ask him: "What are your own womenfolk doing for gas in your own district? Your own wife and daughters, for instance, and the wives of your staff? Are they taking a useful part in the women's societies and clubs that already exist?" And is your National Publicity Association playing an active and audible part? Is it fully represented in worthy and creditable manner on the various Women's National organizations?

For myself, I am convinced that this is the most profitable line to follow—*peaceful penetration of existing societies in the interests of gas.* In every district there is a Townswomen's Guild or Women's Institute. To be exact, there are at present 171 Guilds in all parts of England and Scotland. They are run on lines very similar to the Women's Institutes, only the latter are confined to places of less than 4000 population. Besides, there are innumerable social, political, and charitable societies, not the least important of these being the housing and town-planning societies. Each one of these gives a wonderful opportunity for the dissemination of gas propaganda. It need not be blatant or forced. Discussions are always occurring in which it is possible for a well-informed woman to correct the misstatements of competitors and to put in a word for the advantages of gas. If one could feel sure that all the women's activities all over the country were being covered in this way by the wives of gas men and by gas saleswomen, the net effect would be tremendous. There would be a network of social contacts far more powerful in the end than any new Women's Association that announces itself with a fanfare of trumpets and then subsides into oblivion.

It would be interesting to read views from your readers on this subject.

Yours, &c.,
"WOMAN PROPAGANDIST."

Oct. 16, 1933.

THE NEWS OF THE WEEK

In Celebration of a hundred years' service the Stroud Gas Light and Coke Company staged an exhibition, including cookery lectures and washing and ironing demonstrations, last week. The Company has issued a commemorative centenary booklet.

At a Board Meeting of the Gloucester Gas Light Company, held on Oct. 9, it was announced by the Chairman (Mr. J. H. Jones) that the whole of the £40,000 perpetual 4% debenture stock recently offered to the public had been realized at an average price of £101 2s. 4d.%.

The Darlington Gas Department are holding an exhibition of modern and labour saving gas appliances at the Mechanics' Institute this week, at which gas cookery lectures and demonstrations of gas washing machines are being given in the afternoons and evenings. Alderman Seaton Leng, Chairman of the Gas and Electricity Committee, opened the exhibition.

Practical Gas Cookery Demonstrations, together with an exhibition of modern gas appliances, are being held by the West Bromwich Gas Department at the Gas Showrooms. The opening ceremony was performed by the Mayoress (Mrs. C. B. Adams), supported by Alderman J. E. Cox, J.P., Chairman of the Gas Committee. A cake-baking competition is being organized.

At a Special Meeting of the partners of Coldstream New Gas Light Company, held recently, it was unanimously decided to convert it into a private limited company as from April, 1934, this being the end of the financial year. The Company is one of the oldest in Scotland, having been formed about 1832. The price of gas is to be reduced by 2½d. per 1000 c.ft., making the price 6s. 0½d. for ordinary meters and 5s. for power.

The Energetic Measures adopted by the Blackburn Gas Department to popularize gas were handsomely rewarded by inquiries and sales as a result of very effective publicity at the Brighter Homes Exhibition of the local Chamber of Trade. Thousands of visitors attended, and all the cookery lectures and demonstrations were well attended. The display was arranged by Mr. J. D. Ashworth, the Engineer and Manager, and Mr. T. E. Richmond, chief of the sales side of the Undertaking.

A Successful Gas Exhibition was held from Oct. 6 to 14 in Cambuslang, organized by the Lanarkshire County Council Gas Undertaking. County Councillor Owen Coyle, J.P., Convener of the Gas Committee, was supported at the opening ceremony by Mr. T. Royden, General Manager of the Undertaking. Thanks were expressed to appliance makers for the help they had so willingly given, and Mr. Coyle expressed optimism in regard to the future of gas. In spite of the terrible trade depression in Lanarkshire, progress has been made since the last exhibition was held in 1930.

Floodlighting of Street Crossings is being undertaken at nine further points by the Bradford Corporation Street Lighting Committee, on recommendation by the Chief Constable. Floodlighting hitherto in use in Bradford streets has been by electricity, but the Gas Engineer (Mr. E. Crowther) has been authorized to provide experimental floodlighting at two points to be agreed with the Chief Constable. The lighting of Broadway, a big new central street to be constructed on the completion of extensive building demolitions now in progress, is to be lighted by low-pressure gas on the same lines as the existing lighting of Market Street.

Meeting of Gas Engineers and Surveyors.

A meeting of Highway Engineers and Gas Engineers took place on Saturday, Sept. 30, under the auspices of the Institute of Municipal and County Engineers, the British Road Tar Association, and the Midland Tar Distillers, Ltd.

The party first visited the Queensferry Works of the Midland Tar Distillers, Ltd., where they followed the whole process of tar distillation, a short paper being given by Mr. J. C. Mann, General Works Manager of the firm.

The party then inspected Queensferry Bridge, where Mr. Griffiths, Deputy County Surveyor of Flintshire, explained and demonstrated the working of the bridge.

Later the party was entertained at lunch at the Queen Hotel, Chester, by the British Road Tar Association, and an interesting discussion took place afterwards on the uses of tar in road construction.

National Gas Grid Cut and Dried.

A startling announcement was made in a National Sunday Paper for Oct. 15 that a £10,000,000 gas "grid" scheme is being formulated by the National Gas Council, which will provide work for between 20,000 and 30,000 men.

Here is an extract from the article in question:

"It is proposed to link every one of the 1349 gas undertakings by a grid system with regional centres. The plan will take five years to complete and will benefit more than 36,000,000 users. Every undertaking in the Industry, which employs 113,000 people, will in time be centralized and controlled from London. Where local organizations cannot be linked up direct with the main scheme, regional grids are to be formed. It is estimated that about 800 miles of gas mains, varying from 6 in. to 4 ft. in diameter, will have to be linked in different parts of the country."

As we anticipated, no such cut-and-dried scheme is being formulated by the National Gas Council, and no one was more surprised about the matter than Mr. W. J. Smith, the Secretary, when we called his attention to it.

Touring Campaign at Leicester.

The Leicester Corporation Gas Committee have decided to open a "touring campaign" in the villages around the city.

It is felt that people in surrounding villages are not able to take advantage of the demonstrations which are given regularly at the Leicester gas showrooms, and the Committee have therefore decided to give demonstrations in several village halls.

A temporary showroom is to be opened this month at Rothley, where cookery demonstrations will be given, and the next will probably be at Anstey.

In the city two branch showrooms already exist, and another will be opened shortly. Excellent results were reported as a result of the department's stand at the recent Home Life Exhibition, and it was stated that the business which resulted from it constituted a record.

Many fish fryers, it was stated, are now using gas for their cooking ranges owing to the concession in price recently made to give them the same advantage as industrial users. The gas boiler which has been installed to heat the gas offices in Horsefair Street was reported to be giving excellent results.

Gas and Health.

Well-Known Authority Lectures at Blackburn.

Addressing a Blackburn gathering, on Oct. 12, Mr. T. Bowen Partington, F.R.I., F.R.E.S. (London), the well-known health authority, referred to the use of gas in the preservation of public health.

He said prevention was a quality they tried to exercise in most things in life. Then why not apply it to their health? In this connection it was well to remember the service rendered by gas—a commodity which science had provided as an aid to health. He recognized from a national and an individual point of view gas was something capable of rendering useful service to this great cause.

The pollution of the atmosphere by the old-fashioned fire had largely contributed to various forms of respiratory diseases. At one time it was considered that this pollution was due to the factory chimney. But what contributed more to this pollution was the domestic chimney, and here

it was that gas was able to render mankind a useful service.

Mr. Partington also emphasized the beneficial effects of gas lighting. Quite a lot of ill health to-day was primarily due to fatigue, and nothing contributed more to this than eye strain. Gas obviated undue glare and thereby prevented bodily fatigue. Gas was also serviceable in the kitchen arrangements because it rendered possible careful and scientific cooking, and the vitamins so essential to health were retained in the food. He was not claiming gas was a cure-all, but he wanted people to recognize that in gas science had given them an ally which was important in maintaining what was, after all, life's greatest gift—good health.

National Gas Council.

Meeting of Central Executive Board.

A Meeting of the Central Executive Board of the National Gas Council was held at 28, Grosvenor Gardens, London, S.W. 1, on Tuesday, Oct. 10—Sir DAVID MILNE-WATSON, LL.D., D.L., in the chair.

Coal—Proposed Reorganization Schemes.—It was reported that an interesting experiment was being tried by the West Yorkshire Colliery Owners, where advantage had been taken of the provisions of the Mining Industry Act of 1926, to set up a Federation designed to bring about co-operation between the various collieries in the district on a voluntary basis. It was also reported that certain alterations had been made by the Mines Department in connection with the Durham District Coal Mines Scheme, 1930. The object of these amendments appeared to be to prevent evasion of the provisions of the Scheme, particularly with regard to minimum prices.

Selling Gas to the State and Public Authorities.—A report of the action which had been taken by a Joint Committee of the British Commercial Gas Association and the National Gas Council in connection with the use of gas by municipal authorities, county councils, multiple shops, &c., was considered and approved.

Experimental Application of the Two-Part Tariff for Domestic Consumers.—The result of the operation of a two-part tariff in the case of domestic consumers throughout a period of twelve months by an undertaking in the Provinces was considered.

Position of Certain Smaller Gas Undertakings.—The position of certain of the smaller gas undertakings needing financial and other assistance for the purpose of consolidation and development was considered, and it was suggested that. wherever practicable, a policy of joint working or absorption should be adopted.

Progress in Gas Lighting.

The following extract is from the report prepared by the Technical Committee of the Illuminating Engineering Society, and presented at a meeting of the Society on Oct. 10:

The past year has been marked by improvements in gas lighting units, more particularly for exterior illumination, as, for instance, street lighting, shop lighting, and floodlighting. Gas for floodlighting has been applied successfully to a number of distinct purposes. It has been used for the illumination of sports and recreation grounds, including swimming-pools, and of architecture and gardens; also in connection with the transport industries, rail and road. It is worthy of note that, from the practical point of view, floodlighting by gas originated from the displays arranged in London and other places on the occasion of the International Illumination Congress of 1931, and may be regarded as an illustration of the stimulating influence of these Congresses. It seems certain that as the existing industrial depression disappears the use of floodlighting will become more and more popular.

Directive lighting by gas, including floodlighting, owes some of its development largely to the successful application of special glass having both good optical and good refractory properties. The importance of mechanical details as a means of ensuring accurate positioning of reflecting devices has been recognized, and good progress in this direction has been made.

Further progress has been achieved in the design of new gas lighting units for use outside shops—the design and finish being such as to harmonize with modern ideas regarding appearance. Some studies have been made of the factors which contribute to the depreciation of gas lighting with a view to ascertaining how a high standard of maintenance can be assured with the least expense.

Clockwork control of gas lamps has been improved, particularly in the direction of reducing gas consumption by avoiding the use of a by-pass, except for a few moments at the time of lighting.

Progress has also been made in fittings for interior lighting. A special tube for supplying gas to table fittings, together with improvements in the manufacture of the fittings, have resulted in good appliances of this kind being produced at a low price. Switch control of gas-lighting units for interior illumination has been still further developed. Some preliminary steps have been taken towards the standardization of certain parts of gas lighting equipment, more particularly with regard to gas mantles, and further work towards this end is in hand.

It is worthy of note, finally, that technical information regarding gas lighting units is becoming more and more available to lighting engineers.

Creosote for Fuel in Furnaces.

The British Standards Institution has just issued a specification for Creosote for Fuel in Furnaces (B.S.S. No. 503, 1933) which should prove extremely useful to the users of heavy oil as a fuel, in oil burning installations.

The specification provides for creosote produced as a distillate of coal tar, and it must be free from admixtures of petroleum oils, or undistilled crude tars.

In view of the importance of maintaining fluidity it is required that the oil should be free from organic acids, sediment, or other impurities likely to choke the burners, and attention is also called to the fact that with some grades of creosote that are covered by the specification it will be necessary to provide warm storage and heated pipelines.

The specification includes requirements for the physical properties of the material, such as specific gravity, viscosity, water content, matter insoluble in benzole, fluidity, flash point, ash, and calorific value. Details as to the method by which the tests for the determination of these requirements are to be carried out are given in Appendices to the Specification.

Copies of this specification (B.S.S. No. 503, 1933) can be obtained from the Publications Department, British Standards Institution, 28, Victoria Street, S.W. 1, price 2s. 2d. post free.

Neater Heating Gas Sales Aids.

A useful booklet has been issued by Messrs. Sidney Flavel & Co., Ltd., of Leamington, with the object of portraying the many "sales helps" available for the "Radiant Panel" gas heater manufactured by the firm.

Messrs. Flavel & Co. are anxious to co-operate with gas undertakings in every possible way to further the sales of these heaters, and the contents of this booklet include typical examples of forceful showroom window displays, cut-outs, counter displays, advertising literature, press layouts, posters, &c. A typical window display is shown at the outset, which can be built up with the aid of display ideas illustrated in the booklet. Simplicity of construction has been the main consideration, and the display can be erected quickly, as each item is self-contained. The various component parts of the display supplied by the firm are described in detail, together with the method of building them into a composite whole.

An ingenious counter display comprises two quarter-size models of the "Radiant Panel" heater reproduced in cast iron with black panel and small piece of flame-coloured glass, behind which is fitted a miniature burner, together with ¼-in. brass union to connect up with flexible gas supply. The reflection of the light on the glass attracts attention when the model is placed in a suitable position.

The heater, as has doubtless been noticed by our readers, is being extensively advertised at the present time in the National Press, weekly magazines, and monthly journals appealing to the home lover, and to supplement this publicity Messrs. Flavel & Co. are prepared to contribute 50% of the cost of all local Press advertising in connection with the heaters in towns where they are on show on favourable re-sale terms. The booklet gives examples of seven alternative layouts for 7-in. single-column advertisements which can be made up to suit individual requirements. Undertakings wishing to carry out their own advertising will be supplied with electros of any of the illustrations. Examples are also given of double-column insertions suitable for local magazines, with alternative illustrations more suited for art paper. To indicate the various finishes in which the "Radiant Panel" heaters can be supplied, the firm have produced an attractive colour-card which is available on application.

It may be mentioned that Messrs. Flavel & Co. have a permanent exhibition of their appliances at 38, Welbeck Street, W. 1.

IN AMERICA WITH THE INSTITUTION

By THE EDITOR.

Chicago "Tribune" Building.

CHICAGO.

Upon arrival at Chicago early on Sunday morning, Sept. 24, we were met by friends of the American Gas Association Reception Committee, the constitution of which was as follows: Mr. C. E. Paige, Vice-President of the Brooklyn Union Gas Company, N.Y. (Chairman); Mr. Arthur Hewitt, President of the A.G.A.; Mr. B. J. Mullaney, Vice-President of the People's Gas Light and Coke Company of Chicago; and Mr. H. Leigh Whitelaw, Vice-President of the American Gas Products Corporation, New York. Situated a few yards away on Michigan Avenue (sometimes familiarly referred to as " Boul. Mich.") is the Stevens Hotel, at which we were booked to stay, and in a very short time we were lost in its ample proportions. A brief description may be excused of " the largest hotel in the world," a photograph of which we are able to reproduce on this page.

The Stevens Hotel must be taken as part of its magnificent position on the " Bond Street of Chicago," a thoroughfare laid out with three roads for motor traffic, grass lawns, and fountains, and on the shore of Lake Michigan. Close by, on a continuation of the lake shore is the Century of Progress Exposition, about which more shall be said later. The hotel itself was conceived as the greatest hotel of all time, and one can hardly imagine the conception being challenged at any time. It is 29 storeys high, and includes 3000 outside bedrooms, each with private bath, circulating ice water, &c. Many of these, of course, are double. There is a library of 25,000 volumes; an exhibition hall covering 35,000 sq. ft.; a telephone system that would serve a city of 15,000 persons; " the largest ballroom in the world," and seven smaller ballrooms; four large restaurants, as well as a commodious popular priced lunchroom; and a 1200-seat theatre. At the time of our stay, the hotel was crowded, as, in addition to the number of people in Chicago for the Exposition, it was housing a few other conventions, besides that of the A.G.A. No wonder, therefore, that the overseas gas delegates never found themselves all together at one time.

Proceeding to our rooms upon arrival, we found awaiting us full details of the excellent arrangements that had been made on our behalf, and these were accompanied in each case by a handsome present from the A.G.A., in the form of a leather wallet in which to carry the literature that it had been rightly assumed we should accumulate. With the gift came a hearty welcome, and the best wishes of the Association for a pleasant and profitable visit.

Sunday and Monday were " free " days, which most, if not all, of us devoted to visits to the World's Fair (or Exposition), and to admiration of some of the more striking of Chicago's architectural features. Chicago may be accepted as a manifestation of modernity and unbounded

THE STEVENS HOTEL, CHICAGO.

The world's largest hotel, in which the International Gas Conference and the Fifteenth Annual Convention of the American Gas Association were held.

MURAL, SHOWING PROGRESS OF THE MANUFACTURED GAS INDUSTRY.

With model gas plant below picture, as shown at the Century of Progress Exposition in Chicago.

vitality, and regarded in this—its true light—it is undoubtedly a great city.

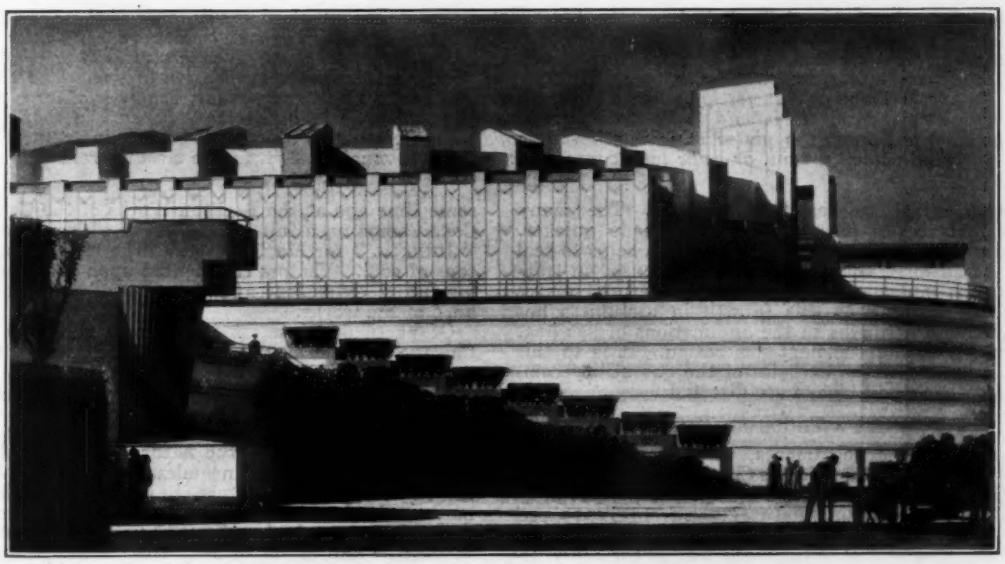
To furnish some idea of the special architectural features alluded to we reproduce an excellent photograph of the "Tribune" Building. This is floodlighted at night, with a most striking effect, even in a thoroughfare which, with shop lights, street signs, public lamps, &c., is almost as bright by night as by day.

Certainly, to those accustomed to a quiet life, traffic conditions in Chicago would seem strenuous, and some do take taxis for other reasons than the distance to be covered. But the traffic police are strict, and there are many of them. Signals, too, there are in abundance. If it is true that the United States possess only 65% of the world's motor cars, then Chicago must have more than its fair share. This is the idea one gets from a study of Michigan Avenue. In the streets at the back of it, of course, in addition to the motors, there are tramcars on the road, and above these an overhead railway.

Gas Supply of the City.

One day in the early part of September, 1850, the inhabitants of Chicago—which was then just 17 years old—deserted their homes and places of business to see the miracle of gas light for the first time. This first gas light was in a store that sold supplies to prospectors on their way overland in the great gold rush of that period. The population was at that time just under 30,000, but Chicago was beginning to fulfil its great destiny. It had been realized that the town needed a gas supply, and a group of leading citizens combined to build a coal gas plant at the edge of the town. At first, the City Hall, with its 36 lights, was the largest customer. Eighty-three years later the People's Gas Light and Coke Company of Chicago have laid a greater length of gas mains—about 5 miles in all—to serve the Century of Progress Exposition than Chicago's first Gas Company originally had in the entire city. However, the first Gas Company was not long in making progress. The population went up by leaps and bounds, and at 10 years of age, the Company had laid 53 miles of gas mains, and was serving 2000 customers out of a total population of 110,000.

Another period of ten years brings us to 1870, by which time this population had almost tripled, and the Gas Company had matched the population growth by tripling its miles of mains and building a new plant. Again ten years elapsed, and 1880 found Chicago with a population that had passed the half-million mark. The Gas Company had gone forward without a pause; its service had even continued without interruption through that devastating time in 1871 which witnessed the greatest fire in history, when the City suffered property damage to the extent of over 200 million dollars. From a consumption of 15,000 c.ft. a day



SIDE VIEW OF THE HALL OF SCIENCE, CHICAGO WORLD FAIR.

in 1850, the figure had mounted to 5 million c.ft. a day, and as the gas service improved the price came down.

From then we pass to 1900, when the population of Chicago had grown to close upon 1¾ millions, and electric lighting was coming into use in the better-class homes in the City. We all know the story. The doom of gas was prophesied, but the prophecy itself was doomed to non-fulfilment. For, in the face of all pessimistic predictions, it is noteworthy that gas service since 1900 has grown even faster than Chicago's population—phenomenal as the latter has been. The rise of electric lighting turned the Gas Industry to new fields, and it is in these new fields that the inestimable value of gas has come to be realized. In other words, the term " gas " had come to be synonymous with heat. Day by day it is strengthening its position, as it grows into new uses in the constantly expanding industrial field of Greater Chicago.

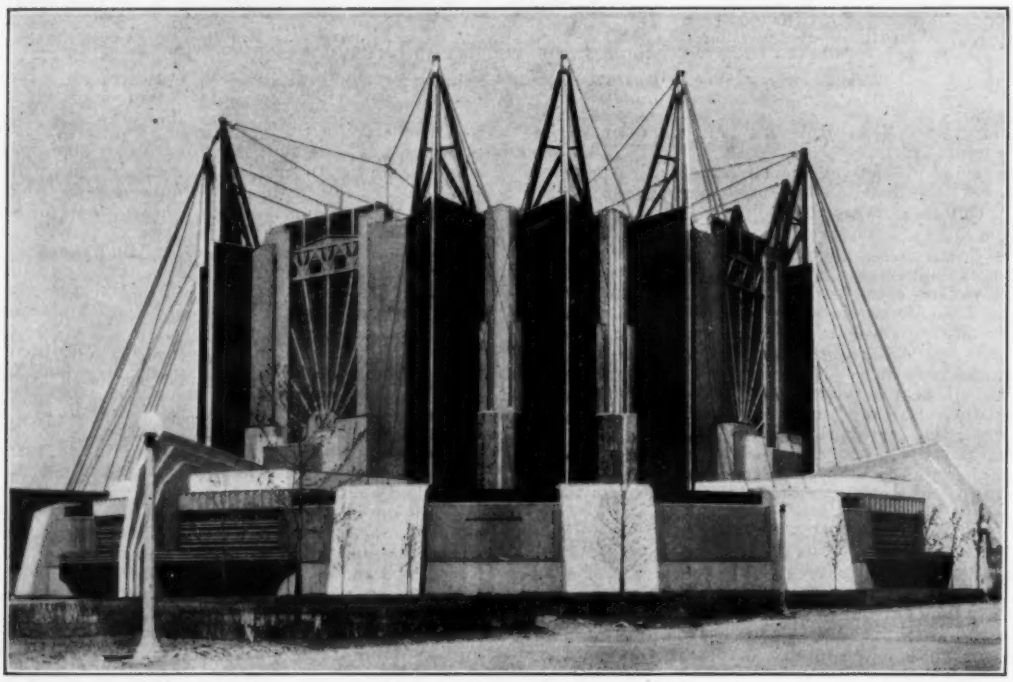
At the present time more than 8700 miles of gas mains serve the 4,500,000 people living in Metropolitan Chicago. It should be explained that " Metropolitan Chicago " embraces the city and its adjacent residential and industrial suburbs in Illinois and Indiana, and while this area doubled its population between 1903 and 1933, the use of gas grew twice as fast. This great increase in gas consumption coincided with the industrial development of the district, which has furnished gas with a multiplicity of new tasks to perform. Gas furnishes heat for manufacturing processes, from melting solder to heat-treating steel. The many operations involved in meat packing are made quicker, easier, and more sanitary with gas heat. Gas helps to seal tin cans, and to forge the heavy metal parts used in tractors and farm implements. Gas roasts coffee and glazes pottery. But striking as this growth in usefulness has been, even greater growths in the applications of gas heat are anticipated within the next generation. It is to this end that the whole of the energies of the gas utility companies in Metropolitan Chicago are directed.

Piping Gas a Thousand Miles.

Along with other developments, time has witnessed a great change in the gas supplied to Chicago. The year 1931 saw the completion of the world's largest and longest pipeline, which is now bringing natural gas from Texas and supplying it to the homes and industries of Chicago. Obvious difficulties at first stood in the way of the construction of such a pipeline, but the growth of the area, and its increasing potential demand for a larger supply of gas than could be produced in Chicago without great additional investment in gas producing equipment, decided the gas utilities in the Chicago area (not including the Indiana companies, which are not now distributing natural gas to their customers) to join with other companies owning gas producing acreage in Texas in the construction of this 1000-mile pipeline. The total investment in the project was $75,000,000, making the pipeline one of the world's largest private enterprises. Steel pipe—418,000,000 lbs. of it, laid 6 ft. beneath the surface of the ground—carries the gas at pressures as high as 600 lbs. per sq. in., a pressure thought impossible a few years ago. The daily capacity of the pipeline is 1,800,000 therms of gas.

Visits of Interest.

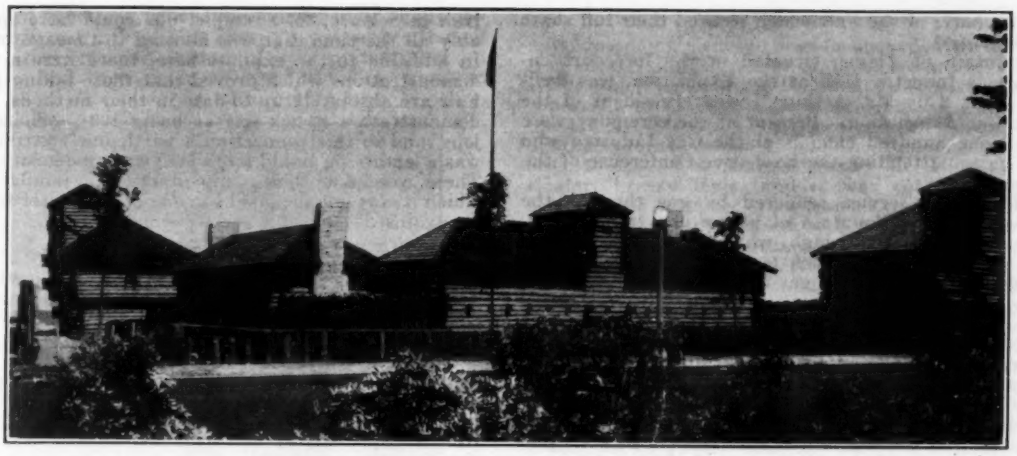
A number of alternative visits had been arranged by the People's Gas Light and Coke Company, and as we had several days in Chicago there was opportunity to see everything. One of the visits was to the Crawford Avenue Gas-Works, over which the visitors were shown by Mr. Locke, the Assistant Superintendent. There is here a Koppers coke oven plant, erected some twelve years ago, complete with outside mechanical producers, bye-products section, water gas apparatus, light oil plant, coal and coke handling apparatus, mixing house, and pumping station. The carbonizing plant is naturally very similar to that installed some time ago at the Beckton Works of the Gas Light and Coke Company, a full description of which appeared in the " Journal " for May 11, 1932. The charge worked is 12½ tons of coal. Visitors commented upon the space available for future extension, and the generally well-kept appearance of the works.



Larger than the dome of St. Peter's or the Washington Capitol, this " sky-hung " dome of the Travel and Transport Building strikes a new note in architecture. The roof is formed of metal plates suspended by steel cables hung from a circle of twelve steel towers, and anchored by huge slabs of concrete. It is the first application on any significant scale to architecture of the principle of the suspension bridge. The Travel and Transport Dome is 125 ft. high and 200 ft. across, without a single arch, pillar, beam, or other support to break its expanse. It is said to be the largest unobstructed area to be enclosed beneath a roof. Expansion joints permit the plates which form the roof to slide over each other, as changes in temperature, wind velocity, rain, or snow load cause differences of as much as 6 ft. in the circumference.

Of particular interest is the fact that gas is sold in Chicago per therm; the gas consisting of a blend of rich natural gas of 1200 B.Th.U. and coke oven gas.

The method of blending proved fascinating to the visitors. The rich natural gas functions as oil in a carburetted water gas plant, inasmuch as it is re-formed; the *modus operandi* being to pass the natural gas through coke in a water gas plant. The incandescence of the coke is maintained at a low temperature, to prevent degradation of the methane in the natural gas; and the coke consumed, instead of being in the neighbourhood of 40 lbs. per 1000 c.ft. of gas yielded, is only some 8½ lbs. In this way the natural gas acts as an enriching agent, to maintain the desired calorific standard of 800 B.Th.U. The quantity of natural gas used



Blockhouses and soldiers' barracks of the "third Fort Dearborn" reappear on the shore of Lake Michigan as part of A Century of Progress Exposition—Chicago's 1933 World's Fair. Built according to the specifications for the original fort, whose inhabitants were victims of the Dearborn Massacre in 1812, this quaint log-built stronghold is a magnet for thousands of visitors.

at this works is generally about the same as the coal gas made.

The slogan of the Company is "If it's done with heat, you can do it better with gas," and this is backed-up by the extremely favourable "therm" charges to the consumers, and by the confidence and keenness of the gas-works staff throughout. To put it in another way (as expressed by an overseas visitor) the staff convince an inquirer that they thoroughly enjoy answering questions. The following figures afford a brief indication of the charges made per therm for various quantities of gas used monthly, on the new residential service basis:

Monthly Consumption.	Total Dollars.	Approx. Pence per Therm.
Therms.		
10	1·84	9·2
20	3·42	8·5
30	4·65	7·7
40	5·35	6·6
50	6·05	6·0
100	9·55	4·77
200	16·55	4·14
400	30·55	3·75
1000	72·55	3·5

The World's Largest Gasholder.

At the West Seventy-Third Street Station of the Company we had an opportunity of seeing the world's largest gasholder, which is of the waterless type. A description of this holder will be found on reference to p. 44 of the "Journal" for Jan. 2, 1929. To the holder is attached a nameplate which tells the story:

1850—1928.
Capacity, 20,000,000 c.ft.
To a better service for the people of Chicago
This largest gasholder in the world is dedicated.
Dec. 19, 1928.

The holder top is lighted at night to give guidance to aeroplanes, there being an aerodrome in the vicinity. The diameter of the holder is 284 ft., and the height of the side sheeting 416 ft.; the total height from the ground to the topmost light which surmounts the crown of the holder being 502 ft. In spite, however, of its great size, the holder throws but the normal pressure of 10 in. It is erected on a site a considerable distance from either of the Company's gas-works, and it is supplied with gas during the slack night hours. At times of peakload, gas is pumped from the holder into the 5 lbs. pressure feeder main which traverses the town, and delivers by governor control at many points to the system of low-pressure distribution mains at approximately 5 in. pressure. There are two pumping sets, each of 500 H.P., and each capable of handling a million c.ft. of gas per hour.

Showrooms to be Envied.

One cannot leave the subject of the gas supply of Chicago without some brief reference (inadequate though it may be) to the magnificent showrooms of the People's Gas Company on Michigan Avenue. It was understood that the building was erected originally to serve as a bank, but the handsome marble so profusely employed makes an ideal setting for a gas showroom. The slogan everywhere exhibited is: "Gas rates are now half what they were in 1930-31." In these showroom windows one noticed again the recognition in the States of the importance of emphasis. A drive is being made in the direction of house heating by gas largely by means of fitting gas burner equipment to existing solid fuel furnaces, on terms extremely favourable to the consumer. And so we see window after window, in probably the most valuable shopping quarter of the whole city, devoted solely to a display of these burners, with appropriate reading lines. The Company are selling an idea before they attempt to sell appliances. No confusion anywhere, but a straight line towards a well-considered goal. Central heating by gas will progress in Chicago.

And the same idea runs through the Home Service Department. It is the idea rather than the appliance. In this Woman's Kingdom, in the basement, even a mere man is made welcome, as the writer found when he inconsiderately walked in at closing time, and was made as welcome by the lady demonstrator as though it had been the middle of the day instead of the moment when she was about to leave for home. Next morning the same lady demonstrator was found actively engaged discussing in a friendly manner domestic problems with housewives who are evidently encouraged to "drop in" for this purpose. The service is worthy of the showrooms. "Handsome is that handsome does"—and Chicago does it.

Century of Progress Exposition.

Of the Chicago World's Fair, there is opportunity now to add but little to what appeared in the "Journal" for June 7 of this year, but there are reproduced here some of the very fine illustrations that were given in our pages on that occasion. How busy this great international event has made the city may be gathered from the fact that, in the July issue, the *American Gas Association Monthly* made the remark that "Chicago is eagerly awaiting the arrival of the A.G.A. representatives, as well as delegates to 905 other conventions that will meet in Chicago during the Fair period." Estimates on how long it would require to "take in" the Exposition vary from a week, for a business man's whirlwind survey of the exhibits and "a fling at the concessions," to the entire five months' life of the Fair for the individual who wants to do a thorough job of it. Inside and out, the structures are Twentieth Century creations. There are great planes of windowless walls, horizontal terraces, inclined ramps, vertical pylons, geometric towers, and a dome constructed for the first time in history on the principle of a suspension bridge, hung from spider-web "sky-hooks" instead of being supported from the ground. It is in reality a "dome that breathes," made with joints that expand and contract as the temperature varies, resulting in a difference of more than 6 ft. in circumference and a difference of 18 in. in height. In the erection of the buildings savings have been effected that may suggest important applications to the future of the building industry. The erection of many of the windowless and artificially lighted structures was governed by a desire for economy, and to ensure control of the volume and intensity of light at all times and under every atmospheric condition.

To the overseas visitors, of course, the comprehensive gas exhibit provided the main attraction, though there were

many other parts of the Fair which secured their full share of patronage.

The Fountain of Flame, situated in the forecourt entrance to Gas Industry Hall at the Exposition, was dedicated on June 3 by Mr. Arthur Hewitt, President of the American Gas Association. Present at the ceremony were more than one hundred officials of the Gas Industry who were in Chicago attending the Executive Conference of the Association.

Symbolizing the service rendered by gas through the medium of heat, the Fountain of Flame is a tall pilaster-like structure, about 12 ft. high, which glows with various luminous colours, among which is one resembling red-hot iron, suggestive of the use of gas fuel in the industrial and metallurgical industries.

Across the top of the structure is the word "Gas" silhouetted against a jet of luminous gas flame symbolizing the service being rendered by natural and manufactured gases in modern civilization. At the top of a fluted column to the left appears the year "1817" in block letters, designating the year in which the Gas Industry was born, in the States. At the top of a similar column to the right is "1933," symbolic of the 116th year of the gas business in the United States.

The fluted columns glow with various spectral colours, while in the concave central niche of the fountain is shown a large luminous flame. At the base of this flame a jet of coloured and luminescent water bubbles forth and cascades into lower pools.

In spite of every effort, there was no possibility of any one of us seeing all we should have liked to see. In the Hall of Science, for example, one could have spent profitably all the time that was allotted to Chicago in our tour. In addition to the exhibits here, there were a number of demonstrations which proved that those taking part in the Fair are absolutely up-to-date in their methods. The lady demonstrators struck one as being 100% efficient at their jobs, and in this connection a particularly striking feature was a lecture on liquid air, which was an education in itself. There were doubtless many others of a similar character which it was not the good fortune of the writer to "happen up against."

Luncheon at the Exposition.

While in Chicago, we were entertained at luncheon in the Administrative Building of the Exposition by the People's Gas Company of Chicago. The President of the Company was unfortunately prevented by business pressure from being present, but his place was taken by the Vice-President, Mr. B. J. Mullaney, who heartily welcomed the guests. Some remarks upon the current world position were offered by Mr. Dawes, and thereafter Mr. Arthur Hewitt expressed appreciation of the kindness shown by the Gas Company. Mr. Tarratt also made acknowledgment on behalf of the overseas visitors of the unbounded hospitality extended to them by the Gas Company and by the American Gas Association. He referred to the fact that, upon arrival in the city, the ladies were all presented with a handsome bouquet of flowers, while the men of the party were given (as already mentioned) a handsome wallet which would be a permanent souvenir of a very happy time.

THE A.G.A. CONVENTION

On Tuesday morning, Sept. 26, we found ourselves busily occupied in taking the share so generously offered us in the proceedings of the Annual Convention of the American Gas Association. In the big ballroom of the Stevens Hotel, Chicago, the first general session was called to order by Mr. Arthur Hewitt, the President, who, after the transaction of some formal business, extended a hearty welcome to all present.

The receipt of a number of pleasing messages was announced at this session. The first to be read was: "Members of the British Commercial Gas Association in annual conference send cordial greetings and best wishes to the American Gas Association and their British visitors for a highly successful meeting.—William Cash, President; Francis Goodenough, Chairman." There were also greetings and good wishes from, among others, Sir David Milne-Watson, President of the National Gas Council; the Australian Gas Institute; the Polish Gas and Water Association; the German Gas and Water Association; the Gas Institute of New Zealand; Mr. A. L. Griffith, Secretary of the Society of British Gas Industries; Mr. A. Kellock, Secretary of the North British Association of Gas Managers; Mr. George Airth, Secretary of the Irish Gas Managers' Association; the Danish Gas Association; and the Dutch Gas Association. Mr. Hewitt also acknowledged the receipt of a delightful letter from Sir Francis Goodenough, explaining that he could not accept the invitation to attend this meeting, because of the simultaneous annual gathering of the British Commercial Gas Association.

Readers will recall that in June, 1931, during his Presidency of the American Gas Association, Mr. Clifford E. Paige visited England, and presented a paper to the Institution of Gas Engineers in which he emphasized the magnitude and virility of the Industry in both the United States and Canada, and drew attention to the immense possibilities before it. Later in the same year, Mr. J. H. Canning, President of the Institution of Gas Engineers, and Sir Francis Goodenough, Chairman of the British Commercial Gas Association, paid a return visit to the Atlantic City Convention of the American Gas Association. Previous to this Mr. Canning had been present at the Canadian Gas Association Conference in Toronto. The present visit of so many representative gas engineers will assuredly do much to strengthen still further the cause of international goodwill which was so markedly fostered by the earlier visits here referred to.

International Gas Industry Day.

Of course, on the present occasion the World's Fair was an added attraction to Chicago, and the programme for the A.G.A. convention was so drawn up as to permit of members and visitors spending a good proportion of their time studying the exhibits. The Hon. Rufus C. Dawes, President of the Exposition, in an address during the General Session of the Association, made acknowledgment of the help rendered by the A.G.A., through its splendid support of the project.

Thereafter Mr. George F. Mitchell, President of the People's Gas Light and Coke Company, Chicago, supported the welcomes of Mr. Hewitt and Mr. Dawes, and Major Alexander Forward proposed as honorary members of the A.G.A. the Presidents of the Institution of Gas Engineers, the United Council of the Gas Industry of France, the British Commercial Gas Association, the Swiss Gas Association, and the German Gas and Water Association. Mr. Clifford E. Paige, Past-President of the Association, and Vice-President of the Brooklyn Union Gas Company, then introduced to the meeting the visitors from abroad, calling upon them by name to rise in their places. He said that when, two years ago, Major Forward and he were in England, they received a marvellous welcome, and he hoped the visiting delegates would enjoy themselves so much that they would want to come to the United States again.

A Souvenir.

Mr. Tarratt, M. Baril, and Mr. Escher delivered addresses which were cordially received by the meeting. Following upon this, Mr. Tarratt said the visitors wished to leave in the hands of the A.G.A. a small permanent token of their gratitude for all that had been done for them. "We all know Mr. Hewitt," he said, "and we all love him, and the members of the Institution of Gas Engineers would not like to depart without leaving behind them some permanent token which the President can hand down to his successors as a slight memento of the happy associations between us." He then handed to Mr. Hewitt (who gracefully acknowledged the gift) a silver salver bearing the following inscription:

Presented, as a token of affection,
to
President Arthur Hewitt
and the Members of the
American Gas Association
by President Frank P. Tarratt and the Members of
The Institution of Gas Engineers
attending the International Gas Conference
and the
15th American Gas Convention at Chicago
from 26th to 28th September, 1933,
during the Visit of the Institution to the
United States of America and Canada.

In the evening we were invited to attend the President's dinner in the Tower Ballroom of the Stevens Hotel, and this was followed by a reception and dance in the Grand

Ballroom—all functions which were made additionally enjoyable by the warmth of Mr. Hewitt's welcome. During the dinner, the President informed those present that an arrangement had been made that the B.C.G.A. and the

CLIFFORD E. PAIGE, of Brooklyn,

Chairman of the American Gas Association Reception and Arrangements Committee.

Mr. Paige was born in Cleveland, Ohio, on May 2, 1884. He moved to Springfield, Mass., in 1885, left school in 1897, and worked in a grocery store from 1897 to 1899. He attended the Wesleyan Academy from 1899 to 1901, when he again sought employment in a grocery store and worked there until 1903. In 1903 he entered the employ of the Springfield Gas Light Company at Springfield, Mass., as an office boy, and was made an Assistant Superintendent in 1905. He then became Superintendent of the Malden and Melrose Gas Light Company at Malden, Mass., and became Manager of that Company in 1912. In 1919 he was appointed Manager of the Worcester Gas Light Company, at Worcester, Mass. In 1922 he was elected Vice-President of Charles H. Tenney & Company, of Boston, Mass., and in addition to that position he became President of the Beverley Gas and Electric Company of Beverley, Mass. On Aug. 15, 1924, he became Vice-President of the Brooklyn Union Gas Company. He was President of New England Association of Gas Engineers in 1923; President, New England Association of Gas Managers in 1924; Director of the A.G.A. from 1923 to 1925; Treasurer of the A.G.A., 1926 to 1929; Vice-President, 1929 to 1930; and was elected President in October, 1930.

A.G.A. should remember each other at 8 o'clock that evening—the former body being then also in convention at Bournemouth. He therefore gave the toast of the British Commercial Gas Association, so that a message might be sent wishing them a very successful meeting. Mr. Tarratt having thanked the A.G.A. for their unbounded hospitality, Mr. Hewitt replied: "This is a very happy occasion, so far as I am concerned. I was never so optimistic as at this moment. I feel confident that a kindly Providence will help us out of our present difficulties, in spite of anything we may do." Col. W. M. Carr (Vice-President of the Institution of Gas Engineers) remarked that the visitors had come over for inspiration, and they had received inspiration. They had been amply rewarded by what they had already seen, and would go back with renewed courage to face the difficulties which had for so long confronted them, and which he believed they were now about to overcome.

Mr. A. B. Day, of Los Angeles, extended a cordial invitation to the visitors to go along to California—if not this year, then next. Mr. B. J. Mullaney (Vice-President of the People's Gas Light and Coke Company) said: "I wish you a good time in this country, as I always have when I come over to your side;" and Mr. Tarratt followed by saying to the members of the A.G.A.: "I extend to you on behalf of the Gas Industry of the British Isles a hearty invitation to attend the conference of the Institution of Gas Engineers in 1935 or 1936. I, of course, include in this invitation the members of the Canadian Gas Association. I hope you will come." Major Forward referred to his visit with Mr. Paige to England two years ago, and declared that it was a never-to-be-forgotten occasion.

Second General Session.

Wednesday's General Session opened with the presentation of the annual report of the Treasurer. This was in terms which induced the President to remark that to be in a position to submit such a statement was a great achievement. Mr. Hewitt then proceeded to deliver his Presidential Address, which is published on other pages of our issue to-day. The Address was in Mr. Hewitt's own particular, breezy style, and it was cordially received by the crowded audience who listened to it. We all felt that Mr. Hewitt proved himself both a good friend and a good President. To the visitors the convention was a remarkable one, and it was understood from members of the Association that it was outstanding from among similar gatherings. This success doubtlessly arose from several causes, but above all was the dominating personality of President Hewitt.

As there were several sections sitting at the same time, it was impossible to be in attendance at the presentation of all the papers prepared by members of the gas profession in Great Britain, or to hear all the discussions, but it was gratifying to gather that the overseas visitors had taken their full share in the proceedings. These overseas papers were as follows:

Accounting Section:

"Meter Reading and Collecting of Accounts; Describing Methods Employed by the Portsmouth Gas Company," by Thomas Carmichael, M.I.Mech.E., M.Inst.Gas E., Engineer and General Manager, Portsmouth Gas Company.

ALEXANDER FORWARD,

Managing Director of the American Gas Association.

Mr. Alexander Forward was engaged in newspaper work for many years in Virginia, including the Managing Editorship of daily newspapers. On Feb. 1, 1914, he became Secretary to the Governor of Virginia, serving four years. Upon America's entry into the World War became President of the Virginia Division, Military Training Camps Association of the United States, and as such examined and recommended to the War Department suitable men for officers' training camps. He was appointed a member of the Virginia State Corporation Commission, and took office on Feb. 1, 1918, and soon thereafter secured leave of absence to become Director of Relief Supplies to the Balkan States, with headquarters successively in Athens, Salonica, and Bucharest. He returned in July, 1919, to resume duties with the Virginia Commission, and had charge of rates during period of valuation discussions and development. He sat with the Interstate Commerce Commission in hearings of the South-Eastern Rate Case. During the coal strike of 1922 he was State Fuel Administrator. Mr. Forward was re-elected to the Virginia Commission in 1923, but resigned before the new term began to become Secretary-Manager of the American Gas Association. He was appointed Managing-Director in 1926.

Commercial Section:

"The Commercial Development of the Gas Industry in Great Britain," by T. P. Ridley, F.C.I.S., Assoc.Inst.Gas E., Commercial Manager and Secretary, Newcastle-upon-Tyne and Gateshead Gas Company.

Industrial Gas Section:

"Watson House—English Research Centre," by C. A. MASTERMAN, M.A., F.I.C., Chief Technical Officer, Watson House, Gas Light and Coke Company.

Publicity and Advertising Section:

"Publicity and Industry," by A. P. RYAN, B.A., Publicity Manager, Gas Light and Coke Company.

Technical Section:

"The Preparation of Coke for the London Market," by F. M. BIRKS, O.B.E., M.I.MechE., M.Inst.Gas E., Mechanical Engineer, Gas Light and Coke Company.

After Mr. Masterman had presented his paper, Mr. Harold E. Bloor followed with an address and an excellent series of slides depicting the beauties of floodlighting by gas as demonstrated in his own dignified and historic city of York.

It was arranged that at the respective sessions the leaders of the British delegation should be:

TUESDAY.

First General Session	F. P. Tarratt
,, Accounting Section	W. J. Grey
,, Commercial Section	F. P. Tarratt
,, Industrial Gas Section	C. A. Masterman
,, Publicity Section	W. M. Carr
,, Technical Section	T. Carmichael

WEDNESDAY.

Second General Session	F. P. Tarratt
,, Accounting Section	R. Wilson Bartlett
,, Commercial Section	Fred West
,, Industrial Gas Section	F. P. Tarratt
,, Technical Section	R. W. Hunter

THURSDAY.

Third General Session	F. P. Tarratt
,, Technical Section	F. P. Tarratt

MANUFACTURED GAS IN THE U.S.A.

The annual statistics of the Manufactured Gas Industry of the United States, prepared by Mr. Paul Ryan, showed that, in common with most other business activities, it was affected by the almost unparalleled depression which characterized 1932. Despite the generally lower price levels of competing fuels prevailing throughout last year, sales of manufactured gas totalled 358,876 million c.ft., which was a decline of 8 p.ct. from the preceding year. Sales for domestic uses, other than house heating, declined 5%, while industrial and commercial sales were down 20%. Sales of manufactured gas for house heating purposes, however, were only 1% below the previous year. The declining trend in water gas manufacture continued at an accelerated pace during 1932; production for the year amounting to 172,023 million c.ft.—a drop of 11% from 1931, while the decrease since 1929 reached nearly 20%. The quantity of bye-product coke oven gas produced was 49,267 million c.ft., a decline of 12%; while the retort coal gas made (32,197 million c.ft.) was also less by nearly 17%. The coke oven gas figure relates only to bye-product coke ovens which are owned and operated by gas utilities. There were 21 such plants operated by 18 utilities at the close of 1932.

FINANCES AND TAXATION.

It was shown in a report by Major Forward that during 1932 the revenue of the entire Gas Industry in the United States aggregated 753 million dollars, while at the close of the year the Industry was serving in excess of 15½ million customers. As a result of higher costs—particularly increased taxation—the net operating income declined 11%. "I have," said Major Forward, "annually directed the attention of the Industry to the continued and consistent increase in the burden of taxation. In 1924 our taxes amounted to 8·7% of the operating revenue of the Industry, whereas by 1932 the rate had risen to nearly 11% of our entire operating revenue. This tax situation is now nothing short of alarming."

At the close of 1932 the Gas Industry in the Dominion of Canada served over 694,000 customers, or an increase of 1·8% for the twelve months. The revenue derived from these customers was round about $21,500,000, of which $13,000,000 represented revenue from the sale of manufactured gas, and $8,500,000 from natural gas.

The burden of taxation was also referred to in a spirited speech by Judge H. O. Caster, when his appointment was announced as the new President of the Association. In the course of his remarks he said: "We are confronted by a difficult year, but we are going to deal with our problems standing up and facing forward. We are not only responsible for supplying a public utility service, but we are trustees for millions of stockholders. Those who attack the public utilities sometimes forget this. Among those millions of stockholders, a very great number have put their small all into public utilities, and it is our responsibility to stand up and fight for them. They are looking to us, not only to protect their life savings, but to see that they get something in return for the investments they have made."

We finally took leave of Mr. Arthur Hewitt in Chicago on the evening of Thursday, Sept. 28, and it is to be hoped that we were able to make him understand to the full the depth of our gratitude for all that he had done for us, and the sincerity of our hope that we shall soon meet again. The night was spent in travelling to Cleveland, where another warm welcome awaited us.

THE VISIT TO CLEVELAND

On arrival at Cleveland, which is a city of diversified industries, we were met by a Reception Committee composed of representatives of the East Ohio Gas Company and the A.G.A. Testing Laboratory, and escorted to the Hotel Cleveland for breakfast. Afterwards there was a visit to the Laboratory, in the library of which we were addressed by Mr. R. M. Conner, Laboratory Director. This was followed by an informative inspection of the excellent experimental and testing equipment, by which we were able to appreciate the good work that is being accomplished by the Association. It was seen that the Association possess here a fully equipped station, well able to do all that is required of it. The Laboratory, and a branch one at Los Angeles, which is similarly provided with staff and apparatus, are centrally situated for the convenience of the manufacturers, who find that the Laboratory Approval Seal is becoming essential. This seal, when affixed to a gas appliance, indicates that such appliance has been tested and approved by the American Gas Association Testing Laboratory. The seal is one of the expressions of interest of a great industry in the welfare of the public. The requirements which appliances submitted must meet represent minimum standards for safe operation, satisfactory performance, and substantial and durable construction. The tests are arranged by committees of experts representing every interested national element, including important trade associations. Really, what the A.G.A. seal means is that, under specified test conditions, an appliance has reached a certain efficiency and fulfilled other requirements laid down; adjustment to suit local conditions is, of course, necessary. When properly adjusted, the appliance will work safely, efficiently, and satisfactorily in any district in the United States or Canada. The four 5000 c.ft. test holders provide natural gas, coke oven gas, water gas, and mixed gas, and with these gases available it is possible to duplicate the type of city gas used in practically any town.

THE CLEVELAND TESTING LABORATORY.

The activities of the Laboratory are perhaps as well known and appreciated in Great Britain as they are in the United States, but a tour of the buildings must intensify one's admiration of the great work that is being carried on there. As already remarked, a vital feature of the Laboratory is the scheme under which gas appliances are submitted for test, so that they may bear the stamp of approval. It is found that improvements effected in construction while undergoing investigation will alone often far more than off-set the costs of the test, without taking into consideration improvements that are accomplished by securing safety and economy in performance. Everyone will agree that the use of safer, more efficient, and better constructed gas appliances will result in an increased number of satisfied consumers, which should in the end promote the sale of more appliances and an increased use of gas. Near the entrance of the building is a bronze tablet which correctly describes the aim of the laboratory as being "To promote and develop the Gas Industry to the end that it may serve to the fullest possible extent the best interests of the public." The most modern and most exacting tests are applied to appliances, and it is stated, for example, that gas cooking ranges are subjected to about 160 separate tests. And speaking of gas cookers, it was noticed during the tour that a great deal of attention is being paid at the moment in the United States and Canada to the attachment

of pilot lights to hotplate burners, this method of ignition being exceedingly popular.

A thermal conductivity air-gas ratio apparatus is used to determine whether the gas cocks supplied with ranges submitted for test are designed and constructed so as to ensure sufficient entrainment of air with the gas in the burner for complete combustion with normal adjustment at low pressure. The equipment necessary for properly testing flexible tubing consists of devices which subject it to various mechanical stresses, such as twisting, shock, and pull. Heat and humidity are also applied. After each such test the tubing is required to pass a leakage and capacity test.

In the chemical section the combustion samples from each section are analyzed. Here are iodine pentoxide machines for determining the carbon monoxide present in the products of combustion. This method of determining the carbon monoxide content of a sample depends on the oxidation of carbon monoxide by iodine pentoxide at a temperature of about 300° F. In this reaction iodine is liberated and absorbed by a 10% potassium iodide solution. This solution is then titrated with 0·001 N. sodium thiosulphate, using potato starch as an indicator. The iodine pentoxide apparatus consists of a purifying and drying system made up of two chromic acid towers to remove aldehydes and unsaturated hydrocarbons, a V-shaped tube in which is placed a small amount of solid potassium hydroxide to remove acid gases, and phosphorus pentoxide to dry the sample completely. From here the sample enters the iodine pentoxide U-tube, which is maintained at approximatelv 300° F. The system is then purged with nitrogen to ensure all of the sample passing through the iodine pentoxide, and all of the liberated iodine being purged from the U-tube.

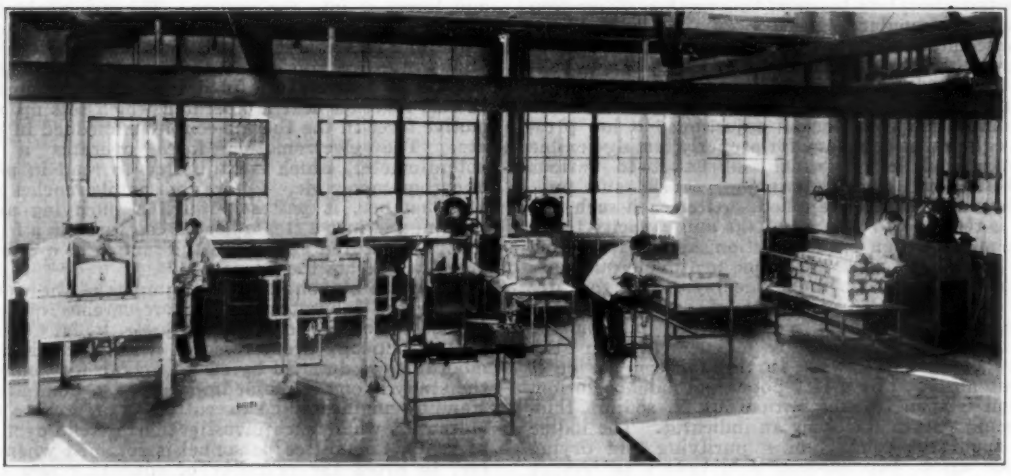
In the space heater section there is an air-tight closed room of 1000 c.ft. capacity, wherein heaters are placed and permitted to burn a quantity of gas containing 20,000 B.Th.U. at each of the three test pressures on each type of test gas. This combustion reduces the oxygen in the room to approximately 18%, and therefore gives a safe indication of whether or not the heater will produce carbon monoxide under a reduced oxygen supply. Adjacent to the closed room is the recording carbon monoxide machine developed by the Mines Safety Appliance Company and the United States Bureau of Mines. This automatic instrument continually draws, by means of a motor-driven pump, a portion of the products of combustion from the closed room, and forces it into the system. The principal part of the system is hopcalite, which is an intimate mixture of copper oxide and manganese dioxide. This chemical is kept at a temperature of approximately 212° F., which is the most favourable temperature for it to oxidize carbon monoxide. In this reaction heat is liberated which sets up an electromotive force in the thermo-couples embedded in the hopcalite. The electromotive force operates a recording potentiometer, which is calibrated to read in percentages of carbon monoxide. Before the sample reaches the hopcalite chamber, it passes through a purifying and drying system, and into a steam-heated coil through a fixed orifice. Thus a measured amount of the sample at a constant temperature reaches the hopcalite.

These are but one or two examples of the work carried out in the laboratory, whose researches quite recently formed the subject of a paper by Mr. R. M. Conner, Director. Practically every research activity conducted by the laboratory is directed by some supervisory Committee. If the study is one of major importance, a Committee of outstanding engineers and executives is created to control it. Moreover, where such investigations extend over a number of years, Committee personnel is retained wherever possible, to avoid the necessity of educating new Committee members concerning work that has been completed prior to their appointment. In some instances, one Committee may supervise several research projects. The A.G.A. Approval Requirements Committee and the group directing the Association's industrial gas research are outstanding examples of this class.

In 1927, a study of the basic theories underlying the practice of gas mixing was initiated. This work was concluded early in 1933, and involved the consideration of more than 250 different gas mixtures and the completion of approximately 300,000 separate tests. One of the outstanding accomplishments in connection with this problem was the development of an empirical formula which permits engineers with the usual amount of information available, to determine mathematically, and without conducting long and expensive field tests, the suitability of various gas mixtures for utilization purposes.

A very helpful study on cast iron bell-and-spigot joints was started in 1929 and concluded last year. This investigation resulted in affording the industry some extremely valuable information on various kinds of joints, gasket materials, and the merits of different kinds of bell-joint

Members of the Overseas Delegation to the International Gas Conference at Chicago who visited the A.G.A. Testing Laboratory, Cleveland, Ohio.

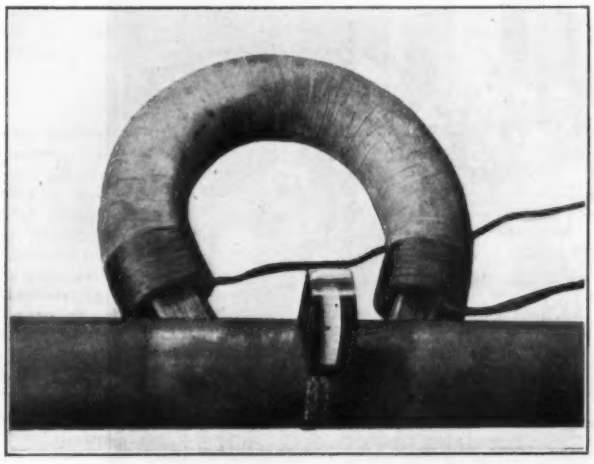


VIEW OF INDUSTRIAL GAS RESEARCH SECTION AT AMERICAN GAS ASSOCIATION TESTING LABORATORY, CLEVELAND, OHIO,

Showing Test Recuperator Behind Line of Test Furnaces.

clamps. Another study of a somewhat similar nature was carried on at the same time for the Cast-Iron Pipe Research Association. This experimental work was confined largely to tests on mechanical joints, and has resulted in effecting many improvements in joints of this kind. One particularly significant feature of the study of these two problems was a decision on the part of the Pipe Joint Committee to prepare test standards for bell-joint clamps and mechanical joints. The laboratory has assisted considerably in this work, and if it is carried to completion it should result in the testing and certification of bell-joint clamps and mechanical joints in a manner somewhat similar to that now being carried out on domestic gas appliances.

One result of the attention devoted to pipe joints was the creation of a desire on the part of distribution engineers to know more about welding and welded joints. Initially, there was a feeling that the art of welding itself should be studied. A preliminary investigation of present practices, however, indicated that very satisfactory joints could be prepared, with reasonable skill on the part of the operator, either with gas or electric arc welding equipment. Consequently, it was decided that the most useful purpose could be served by developing a practical method for testing welded joints in the field. Work of this nature was undertaken early in 1932, and is still in progress to a limited extent. While this study has not been entirely concluded, a weld test meter has been developed that provides a very accurate means for indicating the quality of welded pipe joints. The remaining work required to satisfactorily conclude this problem revolves largely around the application of this instrument to practical conditions existing in the field.



Weld Test Indicator Developed at the A.G.A. Testing Laboratory,

Shown with accessory magnet on 4-in. specimen weld.

A number of interesting studies have likewise been carried on in the industrial gas field. Such investigations were initiated and are being supervised by the Association's Industrial Gas Research Committee. Three very important problems—one on recuperation, another on the elimination of burner noises, and the third on a study of combustion space requirements—have been assigned to the testing establishment and have been under way to a greater or lesser extent during the past three years. The study of the first problem was concluded late in 1932, while the other two were continued during 1933. Bulletins have recently been issued by the American Gas Association Testing Laboratory setting forth the detailed results of these studies, which represent valuable contributions to the literature relating to gas utilization.

During the past seven years, the Laboratory has concluded or initiated eight major research programmes. Furthermore, approximately 325 minor studies had been concluded at the beginning of the present fiscal year, and some 62 additional ones of a similar nature should be completed during this year.

As a whole the Laboratory is a fine illustration of the dependence of industry upon scientific research—which, at Chicago on the previous day, Mr. Dawes had declared it was one of the aims of the World's Fair to show.

A Big Supply of Natural Gas.

At luncheon in the Cleveland Chamber of Commerce (on the 14th storey of a 72 storey building), the visitors were welcomed by the Chairman of that body (Mr. Mansen Havens), who said that they were all exceedingly proud of the research institutions of the city, and of the men who had been bred there and had taken part in the work. Mr. R. W. Gallagher, President of the East Ohio Gas Company and Past-President of the American Gas Association, addressed the guests, and Mr. Tarratt, in reply, said they had had a wonderful time in the Laboratory, and would go back to England with a feeling that it would be well if something of the kind could be started there.

Cleveland is one of the cities in which we saw some street gas lamps. It may be remarked that natural gas is the medium. There is in Cleveland proper a population of over a million, and the city is surrounded by 56 suburbs, each with its own local governing body.

One of the afternoon visits was to the Riverside plant of the Otis Steel Company. Cleveland is one of the large steel centres of the United States, and we saw big billets taken from the open hearth, put through the mill, and rolled into thin strips. This plant was erected recently at a cost of $8,000,000.

An Automatic Water Heater.

Good business is reported in the application of automatic gas water heaters to the home, and in this class of service we had an opportunity of inspecting the " Rex " model of the Cleveland Heater Company. It may be said briefly that this appliance follows very closely upon the general lines of our own gas water heaters; the difference being chiefly in the direction of modifications to enhance economy

VIEW OF GAS RANGE TESTING SECTION AT AMERICAN GAS ASSOCIATION TESTING LABORATORY,
Showing Construction, Combustion, and Efficiency Tests in Progress.

under special American conditions. To accommodate the pressure and hardness of the water supply, the body of the heater is made particularly robust. The insulation is extremely well looked after by rock-wool over 1½ in. thick; while the thermostat is of strong construction, and of a snap-action type which combines reliability with economy in the use of gas. To meet the needs of different sized homes, there are models of different capacities, and means are provided whereby an installation of one size can be put in, with facility to increase the hot water output as the user becomes "hot water conscious," if the term may be allowed. This is a feature which is much appreciated.

NELA PARK.

Our other visit at Cleveland was to the Nela Park premises of the General Electric Company—a visit which proved extremely informative. The lamp department was inspected, and then we were taken to the appliance sales department which deals with kitchen equipment, and also the development and research departments. It is very largely a laboratory institution, created a little over twenty years ago, because it has been found that research can be carried on more satisfactorily away from the various factories making the goods in which the General Electric Company are interested. The institution is also a training centre for the electrical industry. Men and women go there for training in salesmanship, &c.; the courses extending over varying periods. We were afforded an opportunity of looking over the training school, and were able to appreciate how thoroughly the work is done. For one thing, Nela Park is engaged in teaching lighting practice, and for this purpose model rooms, shop windows, &c., on a practical scale are provided. The importance is realized of judging table lamps, &c., individually; and therefore we found a small room set apart—the idea being that a customer should be able to sit quietly there and have lamps brought to him, until he finds one to meet his needs, rather than that he should be called upon to select from a mass.

Later we were shown the General Electric Kitchen Institute, where representatives are thoroughly trained in all kitchen duties and problems. "All you need do to secure the services of the General Electric Institute is to make a very rough sketch of your present kitchen, showing dimensions and equipment you now have. Then call in the General Electric representative, and he will make arrangements with the Institute to help you modernize your kitchen. If you wish, he will make the rough sketch for you. . . . You can buy a complete general electric kitchen for as little as $600, with as long as 36 months to pay, or you can start your general electric kitchen on the step-by-step plan, for as little as $9 down." These quotations go some little way towards explaining the scheme; the series of six kitchens themselves we were privileged to see. The keynote of the display is that to-day the kitchen is changing into a "livable-in" room. We saw first of all the "home-maker's" desk, at which she can plan her meals. Her food planned, it is placed in a refrigerator, which was seen to be provided with pedal action for opening the door.

In both kitchen and lighting departments we enjoyed addresses from representatives on their respective subjects. "Enjoyed" is the correct term to use; for the addresses were admirably delivered by ladies obviously possessing in no small degree both intellectual and physical advantages. The General Electric claims to be the world's largest electric manufacturing company; in Nela Park it possesses a remarkable organization.

A New House Organ.

Watford Company's Co-Partnership Journal.

Last month saw the inception of a further gas company house organ—the Co-Partnership Journal of the Watford and St. Albans Gas Company—a bright little paper full of live, interesting, and useful matter. It is intended to issue the magazine, at 2d. per copy, three or four times a year, and every co-partner in the Company is invited to submit news, articles, cartoons, and photographs which he thinks will be of interest to his fellow-workers.

The necessity for the inception of a publication such as this, it is stated in the Editorial columns, has been thought desirable for some time, and this became even more apparent when the Company amalgamated with the Harpenden undertaking to complete the fifth merger since 1930. The Directors have thus been able to extend the benefits of the co-partnership and pension schemes to a further forty-four employees over an area of supply extending to over 204 sq. miles. Incidentally, negotiations are in progress for the merger of the Rickmansworth Gas Company with Watford. It is hoped that this magazine may serve to spread news of common interest among all employees in every district of the Company's area.

It is very fitting that the Chairman and Managing Director of the Company, Mr. Frank H. Jones, should give this new venture his blessing in a letter to co-partners published in the magazine, as it was largely owing to his great belief in co-partnership that the Directors decided to put a scheme into operation in 1909.

Mr. Frank H. Jones is associated with many great co-partnership concerns, including the South Metropolitan Gas Company, whose scheme was started in 1889.

ANNUAL CONVENTION OF THE A.G.A.

PRESIDENTIAL ADDRESS

OF

ARTHUR HEWITT

[Photo. by Ashley & Crippen.

ARTHUR HEWITT.

Mr. Hewitt is Vice-President and General Manager of the Consumers' Gas Company of Toronto, and President of the American Gas Association. He was born in Wolverhampton, England, in 1868, and went to Canada in 1880. Forty-six years ago he entered the service of the Consumers' Gas Company of Toronto as Private Secretary to the General Manager. In 1907 he was appointed Assistant General Manager, and in 1909 General Manager. He became a Director in 1929, and was elected Vice-President in 1930. Since Mr. Hewitt became General Manager in 1909, the Company's business has grown threefold. In addition to guiding the destinies of one of the largest public utilities in Canada, Mr. Hewitt gives generously of his experience and ability to furthering the interests of the Gas Industry generally. His election to the Presidency of the American Gas Association for the year 1933 was not only an indication of the high esteem with which he is regarded by members of that Association, but also a recognition of the valuable services he has rendered to the Gas Industry for a number of years, both in the United States and Canada. Mr. Hewitt was President of the Canadian Gas Association in 1911.

There are thoughtful people in every civilized country who believe that one of the important needs of the times relates to means whereby international friendship and accord may be promoted. There are institutions and organizations with long names which exist for no other purpose—they certainly could not have a higher purpose—than to sow the seeds of amity and good-will, in order that international misunderstandings and antagonisms may be avoided. The American Gas Association has shown its breadth of view in this regard in a very significant manner. Last year it elected a Canadian, representing a Canadian member company, as its President. That Canadian is deeply sensible of this signal honour.

Two years ago, the then President of the Association, Mr. Clifford E. Paige, and the Managing Director, Major Forward, were honoured guests of the British Institution of Gas Engineers in England, and addressed a representative gathering of the leaders of the Industry in the United Kingdom. Later, we saw on this side of the Atlantic a number of the executives in gas enterprises of Great Britain. And now we have the great privilege of enjoying friendly intercourse with visitors from Britain, France, and other European countries. How glad we are to have them with us!

In an organization as comprehensive as the American Gas Association, it is difficult, if not impossible, within the limited time available, for me to refer in any considerable detail to the many activities and accomplishments of the year. In any event, these matters have been amply dealt with from month to month through the official publications of the Association, while at this Convention papers summarizing our activities in the fields of promotion and research will be presented. together with the Report of the Managing Director.

At the beginning of the Association year now about to end, the revenues of the organization were substantially reduced, due in part to lower gross receipts of member companies, but mainly to a reduction in the basis of gas company dues. Our Control Committee, under the able leadership of Mr. R. W. Gallagher, carefully reviewed the pending and proposed activities of all the Sections and of all the General Committees, and recommend to the Executive Board certain items which, in their opinion, should be suspended, and other items which could be curtailed in cost. For the most part, these recommendations were approved by the Executive Board. The Finance Committee revised the budget of estimated receipts and expenditures so as to trim our sails in accordance with the economic winds.

During the immediately preceding year there had been a substantial reduction effected in the contributions toward Association support on the part of most of the larger gas companies, when the special fund for industrial gas research was merged with the general Association fund.

These two items—the elimination of special contributions for research and reduction in dues—brought about a curtailment of approximately 35% in Association receipts from gas companies. Adjustments were readily made by the Sections, by Committees, and by Headquarters. That work of the Association which was deemed by the Control Committee and by the Executive Board to be the most important, was carried on throughout the year on the reduced basis, and we have lived, as the Treasurer's Report will show, well within the family income. In the language used by the Control Committee in its report to the Executive Board a year ago, "we are solvent and in no danger of being anything else."

We have been most fortunate in avoiding the fiscal and other troubles which have beset so many national organizations during the past few years. The saving of expense to our member companies in their direct financial contributions to the Association is not the only commendable work accomplished through the operations of our Control Committee as endorsed by the Executive Board. By careful analysis of committee activities, and with the cordial support and co-operation of Section officers and general committee chairmen and members, it was found possible to reduce the number of committees and to limit their membership. This has resulted in further substantial savings to member companies in the time and travelling expenses of their employees who are members of committees. In my opinion, the work has been none the less efficient, and we have covered the more important duties which the Association owes the Industry. It is needless to say that these results could not have been achieved without the splendid sympathetic help given at all times by our executives and by our members generally.

No country in the world has been immune from the difficulties of recent years. As we have heard to-day, however, the Gas Industry everywhere has maintained its position of stability—essentially in all countries here represented, and, I have no doubt, in all other countries as well. It is also gratifying to learn that there are indications of returning industrial and commercial activity in Europe as well as in America.

It is simply impossible, with such personnel as we have, that an Industry could fail to do its full part and maintain its position as an essential element of our day. It would be an inexcusable omission if I should fail to refer to the splendid constructive work of the Trade Press of the Gas Industry. Always ready to help, always welcome at our councils, always keeping abreast of or ahead of the times, they are indispensable and deserving of general support.

The manufacturers in our membership, those who pro-

duce gas-making machinery and other equipment, and still more the manufacturers of appliances, have had even more troublesome times than our operating gas companies. Manufacturers' problems are many and difficult, and it is gratifying that we have been able to contribute through our organization towards the attempts at their solution. Our manufacturers are most progressive, and they have placed at our disposal and at the disposal of our customers most efficient, most constructive, and the most thoroughly satisfactory appliances in the history of the Industry. We have nothing to be ashamed of in any way, but a great deal to be proud of. Our manufacturers are well represented on the Executive Board and on a great many of our committees where their contributions are excellent and welcome. They deserve not only consideration, but constructive support in their contributions towards our common cause.

By means of special generous contributions from a group of companies, the larger portion from companies in and about Chicago, we have been able to have a gas exhibit at A Century of Progress Exposition. It is located in Gas Industry Hall, connected with the Home Planning Hall. It represents a modest effort to tell the visitors to the Fair something about how natural gas and manufactured gas are produced, transported, and made available in many ways. Planning and consummating an exhibit intended for purely temporary purposes, with very limited funds and very brief time, was a most difficult task for our committee, of which Mr. R. B. Harper was the Chairman; and the Industry owes them a debt of gratitude.

Someone has said that "Lessons taught by the past are rarely learned, but immediate suffering is the more effective schooling." We have heard much about individual responsibility, collective responsibility, national responsibility, &c., for the unusual conditions which exist to-day. But one thing is certain (to quote the late Lord Morley): "Things are what they are, and the consequences will be what they will be."

As an Industry, we are subject to most of the untoward conditions of the times, and our policies and practices must be adjusted and readjusted from time to time to meet these changed and still changing conditions. New days demand new ways. Like other national industrial undertakings, if we do not deal wisely with our problems while they are ours to deal with, we may drift on till natural forces compel a solution of them in ways which may spell disaster for us. How important it becomes, therefore, that we should adequately support an Association which exists for the sole purpose of investigating, studying, and advising on the great variety of problems, the wise solution of which is of such tremendous importance to the Gas Industry and to the public generally. The past history of this Association has demonstrated the willingness of its members to accept chairmanships of and membership on committees of the various Sections, and the Association has been fortunate indeed in the quality and outstanding ability of the men who have given so freely of their time for the discussions and conferences which have resulted in such definitely helpful reports as have been presented from time to time to the general membership. The past year has been no exception in this regard—in fact, one of the major activities of the past year will be illustrated in a special report which will be presented to this Convention by the National Directing Committee of Executives, through its able Chairman, Mr. Conrad N. Lauer, and I would take this opportunity of urging upon the controlling executives of all member companies that they give their most earnest consideration and active support to the co-operative plans which are being recommended by that Committee.

I desire to record an expression of sincere thanks to Major Alexander Forward, Managing Director of the Association, and to the members of his staff, for the kindly manner in which they have assisted me during my term of office. I want to confess that, with all my previous experience in Association affairs, I have been amazed this year at the tremendous volume and variety of work which has had to be overtaken at Headquarters to keep pace with the demands made upon the Association by its members.

I close this address with two quotations which have impressed me. The sources are distinctly different, but they convey the same idea. One is:

> "What practical moral is there for each of us in the fact that we cannot know the future? This: that we must take part in what is going on about us and not waste our forces in the contemplation of the unknowable, that we must act to the degree that each of us can, as our conscience and duty command."

The other:

> "But the true secret of it all is, that we ought to live as far as we can in the day, the hour, and the minute; to waste no time in anxious forecasting and miserable regrets, but just to do what lies before us as faithfully as possible."

Let us face the future, not with unconquerable despair, but with a great hope.

Address by Frank P. Tarratt, M.Inst.C.E.*

[Extract.]

It is with pleasure that I am here to-day in my capacity of President of the Institution of Gas Engineers, and accompanied by a number of colleagues representative of the Gas Industry in the British Isles. This is the first occasion upon which a deputation from the Institution has visited your country, and it is a great privilege and unique pleasure to address you. I must confess that this is my first visit to the United States of America. I am proud to think that a principal reason for the visit is to bring to you hearty greetings from my colleagues at home and to offer our most cordial wishes that the greatest possible success may attend this international Gas Conference and the 15th American Gas Convention. Among the many events which have occurred and will occur during my period of office as President of the Institution, none will be more treasured in my memory than those of to-day.

I extend to you, Mr. President, an expression of our extreme pleasure in being present when you hold the responsible and honourable office of President of the American Gas Association. We know your ability and grasp of business affairs from our pleasurable meeting with you when you visited England in 1912 and 1926 and attended the meetings of the Institution of Gas Engineers. We desire to convey to you our sincere good wishes for the unbounded success of this Convention and for your continued prosperity.

The Gas Industry, like many others, in our Islands has been experiencing since the war a period of abnormal depression in trade, but in spite of this has been able to maintain and extend its position. The marketing of gas and residual products shows scanty evidence of the grievous conditions that have continued throughout the country for some years. More men are employed in the Gas Industry to-day than ever; fewer, of course, on the manufacturing side owing to the adoption of improved and mechanized working, but a greatly increased number on the distribution and sales side.

On the Stock Exchange Gas Stocks stand higher to-day than ever, and most companies are paying dividends at least at pre-war rates. Gas stocks are considered to be a stable investment, and the shares are eagerly sought for by the investing public. As evidence of the extent of the depression in Great Britain, may I quote the following figures relating to Railways, Shipbuilding, and Coal-Mining which are considered to give an indication of the industrial position.

Year.	Total Railway Receipts. Million £.	Output of Coal. Million Tons.	Shipbuilding Tonnage. Merchant Vessels.
1913	117	287	1,880,000
1920	234	229	2,000,000
1925	196	243	1,084,600
1932	156	212	182,000 (excluding Ireland)

The number of shipbuilding berths in the large districts of the Tyne and Wear is 132; at the end of December last only three were occupied. I am glad to say that this year trade has gradually improved, and, notwithstanding that shipbuilding is one of the last trades to benefit, 18 berths are occupied to-day on the Tyne and Wear. During these trying years we have not relaxed our efforts towards maintaining our manufacturing plants in a highly efficient condition, and schemes of reconstruction have been ably framed, so that every advantage is being secured from the

* Before the Annual Convention of the American Gas Association.

economies to be effected by modern methods of gas production.

The sale of gas has been affected by the variation of trade, and as instance we have a case in Newcastle of a large engineering and armament firm which in 1913 took 250 million c.ft. of gas. In 1918 the firm was consuming at the rate of 1200 millions per annum. In 1922 the consumption dropped to 78 millions. The Gas Sales Department have been able to secure further outlets for gas which have more than made good this huge decrease in demand. In spite of all drawbacks, the total quantity of gas required for all purposes throughout the country has steadily grown, and we are convinced that, with suitable rates available for the different classes of users, we shall make still greater progress.

In an able Address given by your distinguished colleague Mr. Clifford E. Paige, a Past-President of your Association, at the First International Gas Conference and 68th Annual Meeting of the Institution of Gas Engineers in London in 1931, it was explained that you were giving serious consideration to the question of Gas Rate Structure and from the information issued last June by the Statistical Department of your Association it is clear you have made further headway.

The Paper to be presented on behalf of Mr. Ridley makes special reference to the legislative restrictions that prevent many Companies in Great Britain adopting special tariffs suitable for the various classes of service. Relieved of these restrictions we shall be able to offer rates which will be conducive to the greater development and expansion of our business.

The " declared " calorific value of gas in Great Britain usually ranges between 440 and 500 B.Th.U., although the South Metropolitan Gas Company still retains the value of 560 B.Th.U. As evidence of the uniformity of the gas supplied, I would refer you to recent Quarterly Returns of the large London Companies, showing the margin of quality supplied above the declared value:

	B.Th.U. Declared.	Quarter 1933.	
		March.	June.
Commercial Gas Company	500	501·7	503·6
Gas Light and Coke Company	500	503·2	502·6
South Metropolitan Gas Company	560	562·1	562·6
South Suburban Gas Company	560	561	561·7
Tottenham and District Gas Company	500	501·3	500·7
Wandsworth and District Gas Company	500	502	500·7

The regulations of the Gas Referees have been of benefit to the manufacturers of gas and have given the consumer a feeling of great security.

Since the introduction of the thermal method of charging in Great Britain, great headway has been made in the economies of gas manufacture and the value of such gas to the consumers. I observe that rates based on heating values, rather than gas volumes, were introduced by the People's Gas Light and Coke Company, Chicago, in 1930, and since that time 44 Companies serving over four hundred cities and towns have adopted this method of billing. The thermal method of charge introduced into England in 1920 has gradually become almost general throughout the British Isles. Incidentally, it is of considerable interest to us to see for ourselves your natural gas in use and to note what methods are adopted to make gas of such high quality suitable for everyday requirements.

The manufacture of carburetted water gas is not in such general use in Great Britain as in the States; we look upon it as a stand-by for other plant, to meet periods of exceptional demand, and for assistance in regulating coke stocks. With cheap coal available and oil at present prices it does not pay many concerns to make large quantities of carburetted water gas.

During the deplorable coal strike in 1926, from which the British coal trade appears to have never recovered, most gas undertakings, after drawing freely upon their stocks for some time, were compelled to purchase large shipments of coal from abroad; and I should like to bear testimony to the excellent quality of the coal supplied from the United States of America, from both a gas and a coke making point of view. The following figures are illustrative of typical American and Durham coals:

	American Coal.	Durham Coal.
Ash	6·66	7·5
Volatile	37·37	32·5
Carbon	55·97	60·0
Moisture	2·19	1·3

Owing to the thin seams at present being worked in most British coal mines, a careful watch has to be kept for dirty coal containing roof stone and other foreign matter. It is now the general practice among the larger gas undertakings to sample systematically and to test all deliveries of coal either on delivery to works or at the point of shipment, in order to protect themselves in the case of coals having an ash content above an agreed figure. This is necessary if the coke produced is to compete in the domestic and industrial markets with oven coke produced from washed coal. The majority of the enterprising colliery companies have installed or are installing special plants at the pithead for washing or dry cleaning the coal.

Marketing of Coke.

I believe that 30% of the total output of coal in our country is washed or dry cleaned, and remembering that only a proportion of the total output demands such treatment we should acknowledge the extent to which the coal industry has endeavoured to meet our requirements. Gas undertakings on their part are equipping their works with greatly improved coke screening and grading plants, and the marketing of coke is more than ever engaging our serious attention. We can, by selection and blending of coals and by the efficient screening and grading of the coke produced by our various carbonizing methods, produce a fuel that is eminently suitable for all the requirements of the market.

The extraction of benzole from coal gas is now generally considered an economic process and has been adopted by a considerable number of undertakings. Usually the yield of crude benzole is from 2·5 to 3 gallons per ton of coal carbonized.

Carbonizing Plant.

Until about 1912 the coal gas produced in Great Britain was manufactured chiefly in horizontal retorts, and considerable developments have taken place in recent years in horizontal retort practice. Fully charged retorts with extended hours for carbonizing and greater attention to systematized control in the working of settings and in retort house operations have secured greatly improved results, and with the introduction of semi-silica and silica retorts the working life of the retort settings has been greatly extended. We still have many strong adherents to this system of carbonization.

There has been, however, a rapid extension in the adoption of various systems of vertical retorts and chamber ovens, and to-day 60% of the output of coal gas in Great Britain is produced from vertical retorts. The latest type of continuous-intermittent retort will undoubtedly warrant serious investigation, as it would appear to produce an improved—*i.e.*, denser—coke than continuous verticals, and an increased yield of therms with reduced labour costs in operating.

More use is now being made by gas undertakings of the supplies of coke oven gas which are available in certain districts. It can usually be obtained at attractive prices and with guarantees as to constant quality and continuity of supply. The industrial City of Sheffield is only supplying gas produced in the various coke ovens in its vicinity, and it supplies such gas to the Grid area which encompasses Sheffield and Rotherham.

The Gas Light and Coke Company installed in 1932, at their Beckton Works, a coke oven gas plant capable of carbonizing 1200 tons of coal daily, but this is the only instance of an oven plant situated on a gas-works. Results of the working of the installation give every indication of its being a successful plant for gas and coke manufacture. The plant is economical in working and admirably suited to form one large unit of the large gas-making plant at Beckton.

The production of a higher grade of refractory material has been greatly assisted by the Research staff of the British Refractory Research Association acting in co-operation with the Refractory Materials Joint Sub-Committee of the Institution of Gas Engineers. From the experience gained in recent years with silica materials, it is clearly evident that the retorts, horizontal or vertical, can be maintained at a considerably increased temperature over a long period without risk of failure.

Effect of Modern Housing.

The rapid extensions of building operations in recent years in various municipal and private housing schemes, to meet the great shortage that had arisen as a result of the almost complete stoppage of house building during the years 1914 to 1918, has carried with it a correspondingly large extension of distributing mains and services. Most of the newly erected houses have been piped for gas and are usually equipped with lighting points, a gas cooker, wash-boiler, and at least one gas fire; even in mining districts, where free coal is usually available, the housewife

installs a gas cooker to free her from the drudgery of the coal-fired range.

With the multiplicity of public utility services already existing in the roads and footpaths in our large cities, it is in many cases impossible to find room for additional large mains supplying low-pressure gas, and high-pressure mains of smaller diameter have to be used in order to meet the steadily increasing demand arising in outside areas. These mains are usually of steel, well coated and wrapped, and with welded joints. With the great increase in heavy motor traffic greater care has to be taken in protecting mains against damage by vibration and possible breakage, and with reinforced concrete roads the question of accessibility becomes a serious problem.

Domestic and Public Lighting.

Considerable attention is still given to domestic lighting, and every effort is made to retain gas lighting—a system generally preferred in medium and small sized houses on account of softness of light, economy, and the grateful warmth that it provides in the winter months. Systems of maintenance of consumers' fittings have been adopted with material success.

Gas is still the chief illuminant for public lamps in most of our cities and towns and has a greater mileage of roads, in spite of the fact that many municipal authorities own the electricity supply undertakings. Long-period contracts for street lighting by gas are constantly being made and renewed. Quite recently the Gas Light and Coke Company secured a 15-year contract to continue to light 55 miles of streets in London, and the Newcastle-upon-Tyne and Gateshead Gas Company recently made a contract, extending over 10 years, for one of their districts which will double the previous consumption. Similar achievements have been recorded by many other undertakings. Directional reflectors, clockwork control, and experiments in the spacing of lamps and the use of different types of standards have contributed to an efficient and reliable service.

Meters.

There is considerable variation in the specification of consumers' meters at present on the market which come under various denominations, such as "lights," "standard," and "high capacity." The Meters Committee of the Institution of Gas Engineers is engaged in preparing a report as to the possibility of standardizing the sizes and the rated capacities of dry gas meters.

Considerable progress has been made in the standardization of gas appliances in recent years, but we have not yet reached the stage of stamping consumers' apparatus and fittings which has been so successfully carried out by the American, Canadian, and French Associations. A Central Gas Advisory Board has been recently formed, however, and the improving of the efficiency and safety of gas apparatus will come within its purview.

Amalgamations and the grouping of gas undertakings within a limited area must play a great part in assisting the Industry to secure the consumption that must accrue from regional development. With economies that can be effected by cheaper administration costs, the mechanization of office equipment, ability to purchase in the best markets, and the availability of a highly trained business staff, competition will be met on an organized basis.

Gas in Industry.

If an attempt is made to survey the Gas Industry throughout the world, we are at once struck with the constant progress that has been made in the use of gas for multitudinous purposes in the domestic and industrial life of the community; we find evidence of strength and vitality, and will to afford better and greater service. I look forward to the time when gas will be in use in every house and establishment for cooking, heating, and refrigeration; and I believe that we are on the eve of great developments.

With the advice and co-operation of our highly trained scientific and technical men, whose time is employed in investigating these matters, we are assured of progress, although I am of opinion that in the British Isles we have only touched the fringe of what can be done in the supply of gas for industrial purposes. With the exception of small-scale cooking the potentialities of gas in divers directions cannot truthfully be said to have been as yet explored in Great Britain.

Much remains to be done in the way of substituting gas for coal in the older type of large house, in clubs, restaurants, and hotels. Possibly the greatest prospect of development lies in heating water, as an automatic hot water supply is still quite unknown in a large number of houses.

Coke fired boilers have met the position to some limited extent, but this method involves the necessity of storing fuel and removal of ash, and creates unwanted heat in hot weather. I am convinced that the automatic nature of gas water heating will commend itself to a large number of people.

If oil is to be considered as a possible substitute it must be remembered that what oil can do gas can do better—no storage tanks require to be provided on the premises, necessitating periodical cleaning. The standard of comfort in the matter of warmth in our homes is assuredly rising.

We shall hope by paying more attention to these methods to consolidate if not extend the load we already hold.

In the industrial field the prospects appear more attractive as the use of gas for industrial purposes cannot be said to have been seriously considered with the exception of one or two districts. As the industrial depression disappears a large number of furnaces will probably be scrapped and replaced by modern furnaces capable of more accurate control. We know there are thousands of industries each employing gas for several processes, and the great disparity between the huge potential load and the small proportion of our total output is the basis of our faith in the future of industrial gas.

General engineering has perhaps shown more revolutionary tendencies in production methods than any other of our industries. To meet the new conditions the Gas Industry has endeavoured to offer gas apparatus providing at once the certainty and the degree of flexibility so necessary to plants operating on more or less mass production lines.

In North-Eastern England, engineering firms of world-wide reputation now depend entirely on gas for the whole of their heat-treatment plant, which almost without exception is operating under automatic temperature and atmospheric control.

Generally, in the case of industries requiring vast quantities of heat, it would appear that the advantages of gas will justify a comparatively high thermal cost because the final cost is almost invariably lower than the final cost of other fuels, even with good industrial coal at 14s. ($3) per ton.

Speaking on behalf of my own Company, a large rolling mill furnace has been recently equipped with gas, resulting in a saving of 8-10% over the producer gas plant previously used, and success has also been secured in the equipping with gas firing of a very large bread-bakery.

Interesting experimental work is that relative to compressed gas for the propulsion of motor vehicles. With the aid of a four-stage compressor gas is compressed to 5000 lbs. per sq. in. in special alloy steel containers and fed to the cylinders permanently fixed to the vehicle chassis and charged to a pressure of 3000 lbs. per sq. in. In the Newcastle experiment it was demonstrated that a single-deck motor 'bus could be equipped with a charge of gas sufficient to carry it 70 miles. It would appear that 250 c.ft. of gas (500 C.V.) is equivalent to 1 gallon of petrol. So far as it is possible to estimate, the cost per gallon equivalent after making allowances for all compression interest and depreciation charges should not exceed 8·3d. compared with, say, 1s. 1d. per gallon for petrol.

Consideration is being given to the question of supplying bottled gas for domestic and small industrial purposes outside the normal distribution of gas undertakings, and it is thought that these developments will go hand in hand with the gas traction project.

Coke Trade Delegation to Sweden and Finland.

Mr. Ernest Brown, M.C., M.P., Secretary for Mines, announces that a delegation representing the United Kingdom coke producers and coke exporters left this country on Oct. 14, on a visit to Sweden, in order to study, in consultation with representatives of Swedish coke consumers and importers, the position of the United Kingdom coke export market in Sweden, and to consider what steps can be taken to bring about closer co-operation and a larger volume of trade. The delegation will afterwards visit Finland for the purpose of discussing with importers of coke in that country the measures that are necessary to maintain and increase the United Kingdom share in the Finnish coke market, as provided in the Protocol to the Anglo-Finnish Agreement recently concluded.

The members of the delegation are: Mr. Axel Brunstrom, Mr. W. J. Dobson, Mr. F. Greenwell, and Mr. W. Pollock, representing coke oven coke producers; Mr. E. W. Barnett, Mr. Norman Bellerby, and Mr. I. R. Innes, representing gas coke producers; and Mr. W. Lindsay Carlow, Col. Arnold Irwin, and Mr. R. M. Stewart representing coke exporters.

The Secretary for Mines has appointed Mr. H. W. Cole, C.B.E., Deputy Under-Secretary for Mines, to accompany the delegation.

The Place of Oil in the World of Fuel*

By Sir JOHN CADMAN, G.C.M.G., D.Sc.

It is nowadays the fashion to blame oil almost exclusively for the present plight of the coal industry, and, as you are aware, efforts are being made in this country to redress the balance between the two fuels by fiscal measures. In the opinion of some of us, those measures are uneconomic and contain germs of disaster for the coal industry, but that is an issue upon which I will not touch.

The view that oil is solely a competitor of coal and that the advent of oil and the development of oil-consuming mechanisms have brought no advantages to coal is a view which I unhesitatingly reject. Virtually every part of every motor vehicle constructed in this country represents a consumption of coal. A new tyre, the replacement of a damaged part, a fresh coat of paint, even the inflation of an inner tube by compressed air—all these, worked back to their origins in power, have stimulated the production of coal.

The sum of the gifts which oil has made to coal—and I could quote many others—cannot perhaps be precisely stated. But they are there. All who have eyes to see, can see them; and if there is taken into account the fact that without oil and the lubricants which it supplies the industrial demand for coal would almost cease to exist, it will be realized that oil is on balance a benefactor of coal rather than a damaging competitor.

There is a tendency to forget the benefactions and to exaggerate the extent of the damage.

Consider the figures. The greatest and most direct competition between coal and oil has taken place at sea.

The annual production of oil throughout the world at the present time is of the order of 180 million tons. Of that quantity, it is estimated that less than 20 million tons are consumed as bunkers at sea. The world's annual production of coal is vastly greater than that of oil and amounted in 1932 to over 1000 million tons. The maritime consumption of oil, therefore, is small in relation to the world's annual output of coal, and it cannot of itself alone be the cause of all the misfortunes which have befallen the British coal industry.

Between 1913 and 1932 the consumption of coal in this country dropped by 34 million tons to less than 150 millions, but the internal consumption of fuel oil has only risen by 735,000 tons to 1,390,000 tons. There are, of course, many other factors which have restricted the demand for British coal. During the war, for instance, various countries whose coal reserves were hitherto under-developed increased the output of their mines and, for purposes of greater national safety in the event of another war, they continued to maintain those mines in full operation, while other countries have developed their water power in a striking manner.

But there is one more factor, and a very important and suggestive one, which must not be ignored. This factor is implicit in the title of an address delivered before you by Prof. Bone in 1932—"A Century of Fuel Economy." Prof. Bone then gave you a résumé of the economies in coal consumption that had been effected in the manufacture of iron, steel, gas, and coke, and in the production of power. The information he gave is most impressive, and the conclusion to which one is forced on perusing it is that much of the prosperity of the coal industry in the past arose from waste, and that scientific activity devoted to fuel problems has tended to cause a diminution in that industry's prosperity by extracting more energy from every ton of coal consumed.

I have called this a suggestive factor. I will tell you why. It is my firm opinion that the future of the coal industry will come to depend more and more on a progressively greater adaptation of science to the problem of its transformation into power.

There are certain fields which coal as a solid can never hope to reconquer, but science increasingly applied to coal may enable it to rise—a new Phœnix—from the ashes of its own more economical combustion, and seek its salvation in fresh fields and pastures new.

WHAT OF THE FUTURE?

It is no part of my object to-day to assert that the sum of all the purposes which oil now serves indicates the share of the world's fuel trade to which oil has an exclusive right. To do so would be to deny the possibility of change and to ignore certain of the greatest potentialities of coal. Of those the most important is, perhaps, that coal is by no means exclusively and inevitably restricted to utilization by combustion in its solid form. Two methods are available for coal to achieve metamorphosis. The first is gasification, the second, perhaps, hydrogenation.

The gasification of coal is one of the main industries dependent on that fuel and is, indeed—within its limits—one of the most important and technically efficient industries in Great Britain. In many respects, however, the circumstances of its development and its present situation have been more restrictive than helpful.

The Gas Industry is quite dissociated from the coal industry, and relations between the two have always been those simply of a buyer and a seller of material. Where there should have been co-operation there has been the desire on the one side to profit and on the other to buy cheaply, regardless of the range of mutual advantages which lie between those extremes.

Indeed, what a different picture could have been painted had the collieries sold their calories direct to the consumer, whether in the form of a lump of coal, of coke, or gas. The industry would have secured a powerful influence in the land instead of having become a political pawn.

As a consequence of the dissociation of coal and gas, and of legislation, gas undertakings have always been sited in proximity to centres of consumption. From this it follows that the fluid fuel, gas, is transported relatively short distances; and the solid raw material, coal, has to be hauled expensively from the mine to the gas-works, thus denying to the coal and gas industries the benefits which might have accrued from co-operation in attaining a more rational location of gas manufactories.

The operations of gas companies are strictly limited to a defined and local area. The companies may only make gas of a determined purity; they must supply all applicants; they are forbidden to make any distinction between consumers of the same class; their profits are limited to the amount required to pay statutory dividends; and the capital employed is regulated by Act of Parliament.

In consequence of these impediments, and others, the Gas Industry as a whole is in no position to exploit the full potentialities of the fuel which it produces. If its conditions of working had been otherwise than they are—if it had been in close association with coal and if it had been free of the worst restrictions—gas would long ago have provided for several of those demands on land which have fallen to oil.

I look forward, however, to the day when the many restrictions which hamper the Gas Industry will be removed and it will be in a better position to secure the advantages to which it is intrinsically entitled. A time will come, I think, when this country will be served with a limited gas grid, as it now is with an electricity grid, and when our annual consumption of coal gas will be many times its present figure. (In this connection it seems to me to have been an oversight that gas was not included in the legislation regulating electricity.) At the moment, however, the gasification of coal does not bulk largely in the public mind, which is more concerned with the novel and well-advertised prospects of hydrogenation. That it should be so is, I think, little short of a calamity.

HYDROGENATION.

There is no doubt that if solid coal could assume a fluid form its adaptability would thus be greatly enhanced. Technically the process of hydrogenation is already a success. That is to say, coal has already been hydrogenated into oil. No reason is yet apparent which would oppose any technical barrier to large-scale treatment of coal by that process, and the public spirit of Imperial Chemical Industries in making a large-scale experiment is to be applauded. However, scientific standards—to which I would add also technical considerations—are not the sole controlling factors. In some cases—perhaps in that of hydrogenation—it would be better if they were. It has been stated, I believe with a measure of accuracy, that the production of 1 lb. of motor spirit necessitates the hydrogenation of 1·6 lbs. of coal. In addition, however, coal or other fuel is consumed in the operation amounting, in relation to 1 lb. of spirit produced, to 1·6 lbs. of coal. The process of hydrogenation, moreover, needs hydrogen for its accomplishment, and it may reasonably be assumed that hydrogen representing a thermal value of 8300 B.Th.U. is needed for every pound of petrol produced. In all, therefore, 48,300 B.Th.U. in coal or other fuel and hydrogen are

* Extract from the Melchett Lecture delivered at a meeting of the Institute of Fuel and Other Societies, Oct. 11, 1933.

consumed in the synthetic production of 1 lb. of motor spirit which, when it is attained, has itself a net calorific value of 18,900 B.Th.U. per lb. The ratio of potential energy consumed to that produced is, therefore, approximately 2·5 to 1, or a thermal efficiency for the process of 39%.

If, in order to conform with the requirements of modern industry or commerce it is essential that coal should be transformed—whether in whole or in part—from a solid mass to a fluid, it is inevitable that a proportion of energy should be lost in the process.

In the case of gasification—which, of course, is only a partial transformation from solid to fluid—the loss of energy amounts to approximately 20% of that contained in the material treated and consumed. In hydrogenation, however, the loss amounts to over 60% and the object achieved—unlike that obtained by gasification—is the production merely of a substance which, at the present time, Nature itself is yielding in plethoric quantity. To judge by scientific standards, such a transformation is unnecessary and wasteful.

It appears to me, moreover, that the coal industry underrates the merits of the fuel it produces, and I believe that the present and future of coal would be very different if that industry had adopted a different attitude.

In the past, and to a great extent even in the present, the coal industry has concerned itself solely with the production of coal and its sale in the solid mass at the pithead. Thereafter, the industry ceases generally to be interested in its product; and it too often happens that whatever scientific or commercial progress the coal industry makes results not from anticipation of the needs of consumers, but from pressure by them to compel the industry to adapt its products to their requirements. The colliery and the consumer are really out of touch.

The case of hydrogenation is to the point. Whatever the merits of that process may be, it is surely a matter of the first interest to the coal industry that it should be tested. Instead, however, of the testing being done by coal owners, it is the chemical industry which has adopted hydrogenation; and, if that process should succeed, it will no doubt be the chemical industry which will mainly benefit. Again, coal will have lost an opportunity.

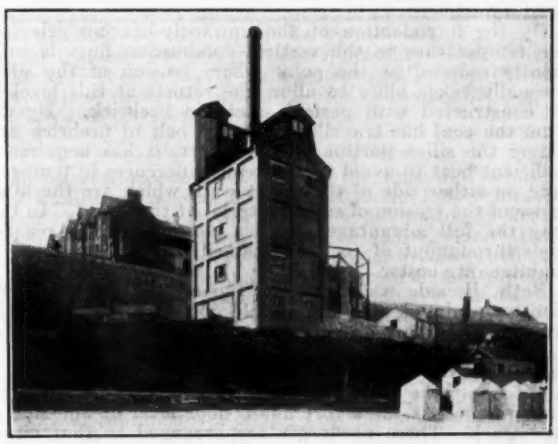
It is encouraging, however, to learn, even at this late date, that the coal industry is becoming alive to the potentialities of union and publicity. I notice that a campaign is to be launched by colliery owners and coal merchants to stimulate the use of coal, to encourage research, and to effect the introduction of scientific coal-burning appliances in place of those which are no longer efficient. That is a step—and an important one—in the right direction.

The world's reserves of fuel—whether that fuel be oil or coal—are limited, even though their full extent remains yet unknown. It is therefore to our interest, and to that of posterity, that each fuel should be made to yield the maximum amount of energy which human ingenuity can extract from it.

To the scientist waste is abhorrent, and I believe that the place which oil has already won for itself in the world of fuel is due to some extent to its efforts to prevent waste, to apply scientific principles in all its operations, and to further the progress of modern civilization, both by adapting itself as rapidly as may be to changing conditions, and by placing itself in the forefront as an innovator and a stimulant to further scientific progress and activity.

NEW CARBONIZING PLANT AT ST. IVES

Inaugurated by the President of the Board of Trade



"Electricity will have to be very wide awake if it is going to beat those in charge of our gas enterprises. For the ease and comfort which have been brought to our towns and households by the improvement in the production of gas we have to be deeply grateful," declared the President of the Board of Trade, the Rt. Hon. Walter L. Runciman, LL.D., M.P. for St. Ives, in formally inaugurating a new installation of Woodall-Duckham upwardly-heated continuous vertical retorts at the Gas-Works, St. Ives, Cornwall, on Wednesday last.

The MAYOR OF ST. IVES (Alderman G. G. Warren), who was accompanied by members of the Corporation, introduced and welcomed Mr. and Mrs. Runciman, and said how sorry they all were that Mr. F. R. G. Grant, their Gas Manager, was, through illness, unable to be with them.

Mr. RUNCIMAN, formally declaring open the new system, said that he had had the honour of a close personal acquaintance with the late Sir Arthur Duckham, the death of whom had been a great loss to British industry. Present members of the firm of Woodall-Duckham, however, ranked among the most able engineers in the country, and although the plant at St. Ives had been already well tested he could assure them that no test was ever necessary in connection with work done by the firm in whose hands he was delighted to see they had placed themselves. The admirable work of the firm was before them, as well as evidence of the enterprise of the Corporation, and through it they would be able to keep pace with the growing demand for gas for lighting and for heating purposes throughout the municipality.

"If you go on at the present rate of increase it will not be long before we are here once again. The women of St. Ives are more concerned with the success of your enterprise than even we are. The gas cooker has revolutionized household life, and the gas cooker has come to stay. From close personal observation of the equipment of the modern household I know that gas plays an essential part. It is with that knowledge that the Corporation embarked on this enterprise, and because they are keeping pace with the times we have reason to be grateful to them. I am glad to have taken a part in declaring the works open and now in full use. The sooner you find it necessary to increase them further, the better we shall all be pleased."

The party then inspected the works.

In the year 1931 the St. Ives Gas Committee were faced with the problem of either extending and re-constructing their existing plant or, alternatively, installing some new type of plant. After a close study of modern systems of carbonization it was decided to replace the horizontal retorts by an installation of Woodall-Duckham continuous vertical retorts. The anticipated saving to the Borough as the result of the substitution of this type of plant was estimated at £400 per annum, after providing for interest and sinking fund charges and in addition to an assured reduction in the price of gas to the consumer. Although the plant has only been in operation for a period of less than nine months, working results clearly indicate that this saving will be effected. Already a reduction of 5d. per 1000 c.ft. has been made to the consumer. A further advantage of this new plant is that it is smokeless in operation, and that, since it produces a superior smokeless fuel in the form of graded coke, it will enable both the industrial and domestic consumers to assist in the preservation of a pure atmosphere.

The new installation consists of one bench containing three latest type upwardly heated Woodall-Duckham continuous vertical retorts, capable of carbonizing 12·9 tons of coal and of producing 252,000 c.ft. of gas a day. The re-

torts are heated by hot producer gas made in two producers situated at ground floor level at one side of the bench. The installation is erected in a new steel framed brick-panelled retort house and is provided with a waste-heat boiler. Coke screening plant and storage hoppers have also been installed adjacent to the retort house.

The retorts are of the smallest type developed by the Woodall-Duckham Company. On small works, in order to obtain maximum flexibility and efficiency of operation, it is desirable that the carbonizing plant should be divisible into a reasonable number of separately controllable units. Although the plant has a gas output of only 252,000 c.ft. a day, there are three independent retorts, so arranged that any one retort can be heated up, cooled down, or scurfed without affecting the others. In this way variations in the demand for gas can be closely met.

The retorts are about 25 ft. high, rectangular in plan, and tapered to allow continuous regular descent of the coal. They are 44 in. long and 10 in. wide at the top.

The retort design is in accordance with the latest Woodall-Duckham practice, into which a number of special features have recently been introduced.

While the vertical flue construction is retained, which ensures rigidity of the retort structure and also facilitates inspection from one level, the combustion of the heating gases takes place in an upward instead of a downward direction. This produces a zoning of heats which has been found to give the following advantages:

(*a*) Perfectly regular travel of coal.
(*b*) Less scurf formation and less loss of time at scurfing periods.
(*c*) Better steaming conditions.

The Woodall-Duckham system of upward heating in vertical flues, which follows the natural flow of the hot combustion gases, is particularly simple to put into operation and to control. When the heats have once been regulated, only the producer gas and the waste gas dampers need adjustment.

By the introduction of the upwardly-heating principle the temperature in the vertical combustion flues is sufficiently reduced at the point where erosion of the silica normally takes place to allow the retorts at this level to be constructed with perfect safety in firebrick. By the time the coal has travelled past this belt of firebrick and enters the silica portion of the retort, it has acquired a sufficient heat to avoid the extreme differences in temperature on either side of the retort wall, which are the main cause of the erosion of silica material at this point. In this way the full advantage of silica construction as regards high throughput of coal is obtained, with a reduction in maintenance costs.

Both the side walls and the top of the bench are efficiently insulated with the double object of improving the working conditions and saving fuel.

Producers.

To supply the gas for heating the retorts, two producers are provided at the retort house floor level at one side of the bench. These producers are arranged so that either producer may be shut down without interfering in any way with the working of the other. The gas from either producer may be taken to the heating flues of any of the retorts. Each producer is large enough to serve two retorts and to afford a supplementary supply of producer gas to the waste-heat boiler. The producers are of the step-grate type and are constructed with ample grate area. This type of grate eliminates the need for clinkering. The only attention required to keep the producer fire in proper condition is a periodical pricking up at intervals of four hours or longer, dependent on the class of fuel used.

The waste-heat boiler, which is of the Woodall-Duckham horizontal natural draught fire-tube type, is designed for a working pressure of 100 lbs. per sq. in. In order that the boiler shall give its maximum output of steam irrespective of the number of retorts in operation, provision is made so that a supplementary supply of producer gas can be mixed with the waste gases before they are passed to the boiler.

To provide the steam requirements of the vertical retort installation in the event of the waste-heat boiler being out of commission, a water tube boiler of the vertical type designed for burning coke has been installed in the existing coal store. This boiler also is designed for a working pressure of 100 lbs. per sq. in.

The contents of the coke chambers below the retorts are discharged either into the side discharging skip or into a steel barrow.

When dealing with the surplus coke the skip is run into the lift and elevated to the level of an overhead gantry, which runs at a level of about 30 ft. from the ground from the lift to the coke screen. The skip is run along this gantry and the coke is discharged on a fixed wire mesh screen which separates the breeze from the coke. The two sizes fall from the screen into a steel storage hopper of about 13 tons total capacity, divided into two compartments, one for breeze and one for coke.

The retort house and the installation are arranged so that a fourth retort can readily be added when required, and the chimney, retort house regulator, foul main, tar and liquor main, liquor circulating pumps, waste-heat boiler, and solid fuel fired boiler are all large enough to serve an extended plant of four retorts.

Luncheon Speeches.

The Mayor, supported by Mr. and Mrs. Runciman, the the Chairman of the Gas Committee (Capt. W. Guppy), the Town Clerk (Col. T. J. Chellew), and members of the Corporation, presided at the luncheon which followed the inauguration ceremony.

Mr. Runciman, submitting "The St. Ives Town Council and Gas Department," added to it the name of the Gas Manager, Mr. Grant, and read a telegram which he asked the consent of the gathering to send to the Plymouth nursing home where Mr. Grant was lying ill, expressing their sympathy and hopes for a speedy recovery. The Gas Committee, continued Mr. Runciman, had been very fortunate in the choice of the firm who had carried out the work. The works were capable of expansion, and expansion would be necessary if ideas were to be carried out. "The tendency of our day," continued the speaker, "has been to go ahead with the development of electricity, at enormous expense, great enthusiasm, and a degree of faith we hope the future will justify. But do not let it be supposed that because electricity has gone ahead it has placed gas at a great disadvantage. There is a place for both. I do not think there have been more successful economies made than in the production of gas. It may be that the price at which bye-products may be sold will enable you to lower the cost of gas to the consumers. If the market price of bye-products improves you will be getting the fullest possible value out of the equipment inaugurated to-day."

Capt. W. Guppy, Chairman of the Gas Committee, proposing a toast to Messrs. Woodall-Duckham, said the latter had a world-wide reputation. A high-class piece of engineering, the contract had been put into hand without delay, and the work was up to specification. The proof of its success lay in the fact that the decrease in the cost of production in the first six months had meant a reduction in the price to the consumer of 1d. per therm, or 5d. per 1000 c.ft. "It is the general comment of all who have visited the installation that the work is the best of its kind, and the excellent finish, not only of the machinery and plant, but also the whole of the structure, does credit to the local artisans who worked under the supervision of the contractors' foreman," concluded Capt. Guppy.

A letter from Mr. Grant, supporting the toast, was read by the Mayor.

Dr. E. W. Smith, Technical Director of Messrs. Woodall-Duckham, replying, said that in their Company they had been taught by their late Chairman that their own satisfaction or disappointment was their best mentor. In this case they were very pleased themselves with the results obtained. However well a contractor built a plant, it was how it was run afterwards that counted; and in this connection the speaker paid a high tribute to Mr. Grant. Gas had a great future, and they were only at the beginning of it. The gas output in America was increasing every year. He would like to tell Mr. Runciman how much the Gas Industry appreciated the way in which it had been dealt with by his Department, but they begged him to speed up the legislation which was only awaiting formal handling by Parliament, and for which the Gas Industry had been waiting for many years. Until there was more equality between the treatment meted out to gas and its chief competitor, the Gas Industry would work under a great disadvantage. They had that day seen what was nearly the smallest vertical retort plant built in the country in recent years, but it was an accepted fact that well over 60% of the gas in Great Britain was made in small verticals.

The Mayor, replying to the toast, said that Mr. and Mrs. Runciman had been prominent for years in the political and industrial world, and although perhaps up to the present not very interested in gas, nevertheless had brought light to many on matters of world importance. Having seen their plant and the quality of their gas they would be able to recommend to those who wanted a good heating medium by day and a good light by night to come to reside at St. Ives. In St. Ives they were blessed by Nature with ample sun to give light and warmth by day, and they had succeeded by the progressiveness and foresight of their Council in giving, with the aid of science, the best light and warmth by night. He was Chairman of the Gas Committee when they were faced with the problem of either expanding and reconstructing the existing plant, or, alternatively, of constructing modern plant. He was pleased that the Gas Committee in their wisdom were sufficiently progressive and businesslike to embark on a scheme of the kind inspected that day. When he was initiated into the advantages and economic running of modern vertical retorts he was immediately convinced that they should march with the times, scrap the plant, and install modern economical and hygienic plant. After explanation the Committee were convinced there was no alternative. The scheme for the installation of vertical retorts coincided with the national economy appeal, and it was fitting that Mr. Runciman, who was a member of the Economy Conference Committee, should be present to see that the St.

Ives Town Council had carried out the wishes of His Majesty's Government, said the Mayor, and he paid a tribute to the St. Ives Town Council, and the Gas Committee in particular, for having undertaken this project. Results had proved that it was a wise and economical step, and they were to be complimented on the success of their venture and the confidence placed in the recommendation of the Gas-Works Manager, Mr. Grant. The expenditure had been amply justified, and the future would prove that more so as time passed and town and district developed, and the consumers, who really benefited financially and otherwise, would no doubt be grateful for that new development. All the employees contributed to the scheme during the difficult times experienced when the work was proceeding, and the consumers should be thankful for the fact that no inconvenience was caused them during the turnover, which was a tribute to all concerned in that work, and particularly to Mr. Grant, to whom it must have been a very anxious time. This was the second successful engineering venture the Council had embarked upon during the last two years, and with other important schemes now in preparation it augured well for the prosperity of St. Ives, particularly in view of the coming enlargement of the Borough.

GAS AT THE NORTH LONDON EXHIBITION

Fine Display by the Tottenham and District Gas Company at the Alexandra Palace

More space than ever has been secured by the Tottenham and District Gas Company at this year's North London Exhibition opened on Oct. 11 at the Alexandra Palace, Muswell Hill, N. 22; for the Company on this occasion occupy the whole of the area immediately inside the main entrance to the Palace, covering a floor area of nearly 3400 sq. ft.

As has been their custom in recent years, the Tottenham Company are again co-operating with a number of appliance manufacturing firms in presenting to the public the widest possible range of gas-using apparatus, and the large area covered by the exhibits is divided up into a series of separate, yet co-ordinated, displays, giving the public plenty of room to move about and examine the exhibits in comfort. A spacious section is set aside for cookery lectures by the Company's experts, and these, in addition to washing and ironing demonstrations, are running continuously throughout the period of the Exhibition. In connection with the cookery lectures, gramophone records of Mr. Therm and "What the Chefs Saw" are periodically reproduced.

On entering the Palace by the main door one is confronted by a spacious "circulating area," as it were, with sections of the gas exhibits on three sides. In the centre of this space, which, by the way, is very effectively illuminated at night by means of six 1500-c.p. Keith high-pressure gas lamps, is a platform raised a few inches above floor level, attractively decorated with plants and ferns, with a "Beacon" radiator in operation at each of the four corners. In the centre is a display table on which are photographs of installations showing the many and varied uses of gas in both home and industry. There is also a case exhibiting some of the many coal tar products obtained from the Gas Industry.

Space will not permit of mention of all or even a few of the very wide range of gas appliances to be seen at the Exhibition, but suffice it to say that the appliances of all the well-known firms in the Industry are represented—heating, cooking, water heating, refrigeration, and laundry—many in attractive colour finishes and most connected up to gas supply. Examples of the glass-fronted gas cooker are in evidence, as also of the latest type of table-top washing machine, modern gas fires with curved and convex radiants, gas fires ignited by means of a little wheel attached to the side, thereby dispensing with the need for matches, patent bowl boiling burners, a self-contained gas kettle, attractive panel and column radiators in coloured and art finishes, panel and inset fires in pleasing surrounds, including a model of the "Red Sphinx" fire fitted with art-finished folding doors which completely hide the fire when not in use. Of particular interest is the fact that the refrigerator section of the exhibit bears the Royal Coat of Arms—for the first time in the history of the Company.

The lighting of the stand is very attractive, a large variety of up-to-date pendants and fittings being on view, all controlled either by catalytic or the ordinary type of switch. In addition, close to the entrance doors, the Company have installed two coke fires, which impart a feeling of cheerful warmth to the visitor upon entering the building.

A Gas-Fired Baking Oven.

An interesting section of the stand contains a 3-ton gas baking oven of special design, manufactured by the Ellerstyle Engineering Company, and operated by Mr. H. Cling, of High Street, Tottenham. The oven is suitable for baking all types of bread, rolls, cakes, pastries, &c., and during the course of the Exhibition rolls are being made to the extent of 180 to 200 at a time and sold to the public at seven for 6d., the proceeds going entirely to local hospitals. The gas consumption of the oven itself is in the region of 180 c.ft. per hour, under thermostatic control, while in conjunction with the oven is a gas-fired steam boiler consuming some 45 c.ft. of gas per hour, which is set to inject steam in a predetermined quantity, according to the thermostat, into the baking oven. The steam has just that right amount of moisture to keep the conditions in the oven sufficiently humid for perfect baking.

The Tottenham and District Gas Company are certainly to be congratulated in staging such an effective display at this Exhibition, which is growing more and more popular year by year. It is also of interest in passing to note that thirty-five other exhibitors at the Exhibition are using gas on their stands for one purpose or another, while four of them have chosen gas for lighting purposes, under the conviction that this form of illumination shows up their goods to better advantage.

Some Further Exhibits.

An interesting exhibit which has not appeared before at this Exhibition is that of the Tottenham Polytechnic, in which the Tottenham Gas Company are naturally keenly interested, as many members of their staff regularly attend classes there. The objects of this school are to provide an organized course of preparatory theoretical and practical instruction for boys about to enter industry; to discover which section of the work is best suited to each boy's abilities; and to continue and improve the general education of the boys. Some of the exhibits on this stand, all of which have been turned out by the boys, are exceedingly commendable, from which one may judge that the proficiency of the members of the Tottenham Gas Company's staff whose practical education is entrusted to this Institution should be well above the average.

Also exhibiting at the North London Exhibition are Messrs. New Geysers, Ltd., of Addington Square, S.E., who have a range of their geysers on view in a number of attractive coloured porcelain finishes. Of particular interest is their "Instor" heater, which has the advantage of being at the same time both an instantaneous and a storage heater, supplying hot water to any tap within one minute of lighting the gas or providing ample storage available for use at any tap without manipulation of the heater. An instant and unlimited supply of hot water is obtainable as with a geyser, and yet the apparatus has the convenience of a storage system in maintaining a supply at a high temperature, so that a full-bore supply of very hot water is always available at any tap.

In normal use the gas is lighted in the morning, when hot water is immediately available; in about 15 minutes the water in the storage section attains a high temperature, whereupon the thermostatic valve automatically reduces the gas to a by-pass consuming 3 to 4 c.ft. per hour. The "Instor" consists of a cylinder of welded steel, galvanized after manufacture, the upper part of which constitutes a storage chamber for water. A geyser of special patented construction is fitted into the lower portion by means of a cast brass flange.

Modern Coke-Burning Appliances.

Once again Messrs. Hobbs Wilson, of 268, High Road, Wood Green, N. 22, are exhibiting at this Exhibition, and on their stand one has come to expect examples of all the latest types of domestic coke-burning appliances and not a few gas appliances as well. This year one is not disappointed, for there are in evidence not only a number of

well-known appliances brought right up-to-date, but also some entirely new apparatus of exceptionally interesting design.

Of the latter, the " Ideal Neofire " coke grate and back-boiler, perhaps, takes pride of place. Many builders of the medium to small sized house at the present time are installing, for reasons, presumably, of economy, what is known as the back-boiler, or hot water system operated from the living-room fire. This is, no doubt, for limited hot water requirements an excellent arrangement for the small household during the winter months. But the chief drawback to the system lies in the necessity of having to light the living-room fire in order to obtain hot water in the summer time, possibly rendering the temperature conditions of the room on a warm day somewhat overpowering.

The " Ideal Neofire " shown on Messrs. Hobbs Wilson's stand would seem to have solved the problem—and solved it in a manner which should prove of considerable interest to the Gas Industry. The fire is designed to take care of 50 sq. ft. of direct radiation, consuming coke or coal, and to provide hot water for domestic purposes by the indirect method, operating a special tubular boiler with 1¼-in. flow and return tappings on either side or at the back. A gas burner of the bar type provides for easy ignition of the solid fuel without need for wood or paper. When, however, domestic hot water is required in circumstances which do not also call for room heating by means of the solid fire, the bottom bars of the grate are simply removed *en bloc*, and a special design of gas burner, connected up by means of a flexible tube from the same source of supply as that feeding the igniting burner, is slipped into a slot at the back immediately beneath the boiler.

In addition to a number of other domestic coke boilers, including the well-known " Cookanheat," which allows full use of a gas oven and three boiling rings independently of the coke fire, examples of the " C.C." coke or gas fire are shown in operation. A coke grate of this type is now available for heating a back-boiler in conjunction with a simple and efficient flue, requiring a chimney breast opening of only 9 in. The wrought-iron boiler is placed above the fire in a most accessible position, the water-heating flue being formed by the front face of the boiler and the back of a single rocking flue plate. The " pull " is therefore always upwards, giving a bright fire with either flue in operation. The flues, being straight, cannot soot or choke up, while the flue plate is easily removed for chimney and boiler access.

A number of radiators are to be seen in attractive colour finishes, together with a novel design of revolvable wash-boiler, and this stand is, of course, gas lighted throughout.

Thanks to these respective firms, the Gas Industry has a very representative showing, and a more extensive and varied one than ever before, in this year's North London Exhibition.

NOTES ON PLANT AND PROCESSES

Shades for Gas Lighting.

A new catalogue issued by Messrs. Lighting Trades, Ltd., and the Welsbach Light Company, Ltd., of Farringdon Road, E.C. 1, contains a varied range of shades specially for gas lighting—in silk, glass, marbleoid, glasene, &c., a number being illustrated on attractive colour plates.

Particular attention should be directed to the very pleasing lines in indirect lighting bowls of decorated " Flakestone," illustrated in full colours, which should do much to enhance the prestige of gas lighting.

Chimneys, globes, and reflecting shades of various descriptions are also dealt with in the catalogue.

Cannon Inclined Gas Fires.

The new season's gas fire catalogue, just published by Cannon Iron Foundries, Ltd., of Deepfields, nr. Bilston, Staffs., is not only an admirable and attractive production from every point of view, but also sets forth in a very lucid and convincing manner the advantages of the inclined gas fire, on which type this firm now specialize.

In addition to the great advantage claimed of giving more useful heat, the inclined fire possesses several unique features which materially reduce maintenance costs. New radiants can be more readily fitted, resulting in a considerable saving of time, as no fuel bar is used, any risk of breakage during refitting being thereby eliminated. When it is found necessary to replace a brick, the fire need not be disconnected; it is only necessary to remove the side pillars and fender, and the brick can then be removed from the front.

When a consumer wishes to fit a gas fire in front of an existing coal grate, the inclined fire is often the only one which can accommodate the projection of the bars. The cavity at the back of the fire renders the removal of the bars unnecessary, thus resulting in a great saving of time and labour, especially when the bars are of a heavy type. The available depth, front to back behind the fire, is 4 in. at a height of 3 in. above floor level, narrowing to 1½ in. at 10 in. above floor level.

The catalogue gives full particulars and illustrations of the firm's leading ranges of gas fires, including inset types and the new " Auricula " and " Aubretia " models, while an extensive section is devoted to depicting fires in the various attractive colours and finishes in which they can be supplied—these including pastel blue, green, brown, stone, gold, and silver, in addition to a number of pleasing art metal finishes to harmonize with any decoration scheme. A number of typical installations are shown in attractive settings of modern rooms—a very fine achievement in colour printing.

Also included in this catalogue are details of various of the firm's gas radiators, including the popular " Beacon," with its luminous burner and orange-coloured glass window to give an appearance of cheery warmth. In old gold finish, this appliance makes a very efficient and attractive heater for the hall or landing, while the boiling burner concealed in the top gives it a further sphere of utility.

Rational Radiant Heating.

In an interesting little booklet recently published by the Research Laboratories of the Parkinson Stove Company, Ltd., a description is given of the distribution of radiant energy illustrated by new graphical methods, with a view to setting forth the advantages of the firm's new " Curvex " gas fire, and comparing its radiant efficiency with that of the flat type.

The Parkinson Stove Company have devoted considerable attention to this matter of distributing the radiant energy of a fire to give the maximum heating service, and the " Curvex " is the result of this study. Spot lighting, they suggest, should have no heating counterpart; a searchlight effect is undesirable. There are some rooms in which the only place which can be described as comfortably warm is occupied by the cat—until the mephitic odours arising from its scorched fur lead to its expulsion from the hearthrug. Politeness preventing any of the occupants of a room from sitting directly in front of the fire, the unfortunate individuals are compelled, when " nicely browned " on one side, to change places; and a compulsory game of human chess is hardly conducive to comfort. In the " Curvex " fire the amount of useful heat is stated to be increased and distributed over such a wide angle that no part of the room is outside the range of its radiant beams, these advantages being secured without in any way detracting from the appearance of the fire.

A number of diagrams show vertical and horizontal distribution of radiant heat from different types of heating surface. A disadvantage of the Polar curve method of representing radiant distribution is that the latter can only be shown on one plane. By use of an equal-area projection such as is used in map making, the distribution of the whole hemisphere may be included in one diagram, and all points of equal radiant intensity are enclosed by means of smooth continuous curves, which the Parkinson Stove Company have termed " Iso-Rads."

The question may very well arise, " How close to the sides of a fire must one sit to receive an equivalent amount of radiant heat to that intercepted at a given position in front of the fire? " In answer to this, " Lines of comfort," or " Lines of equal warmth " have been prepared, which are directly calculable from the " Iso-Rad " diagrams by application of the laws of inverse squares.

The booklet concludes with a number of illustrations of the firm's latest types of " Curvex " and " Panno " fires, with particulars of each.

Propulsion of Motor Vehicles by Gas.

A brochure of considerable importance to the Gas Industry, in view of the progress which is being made in high-pressure gas for the propulsion of motor vehicles, has been published by Messrs. Vickers-Armstrong, Ltd., of Elswick Works, Newcastle-upon-Tyne.

After an interesting foreword dealing with the subject from a general viewpoint, and with the experiments leading up to the development of the firm's special alloy steel

cylinders for storing the compressed gas at 3000 lbs. per sq. in., the brochure goes on to describe the fitting up of the vehicle for propulsion by coal gas, with the help of illustrations. The usual equipment, it is stated, embodies a set of six cylinders—each 6 ft. long by 8 in. outside diameter, and each containing 359 c.ft. of free gas at the working pressure previously mentioned. Approximately 250 to 260 c.ft. of gas are equivalent to 1 gallon of petrol, and each cylinder, therefore, contains the equivalent of about 1·43 to 1·38 gallons of petrol.

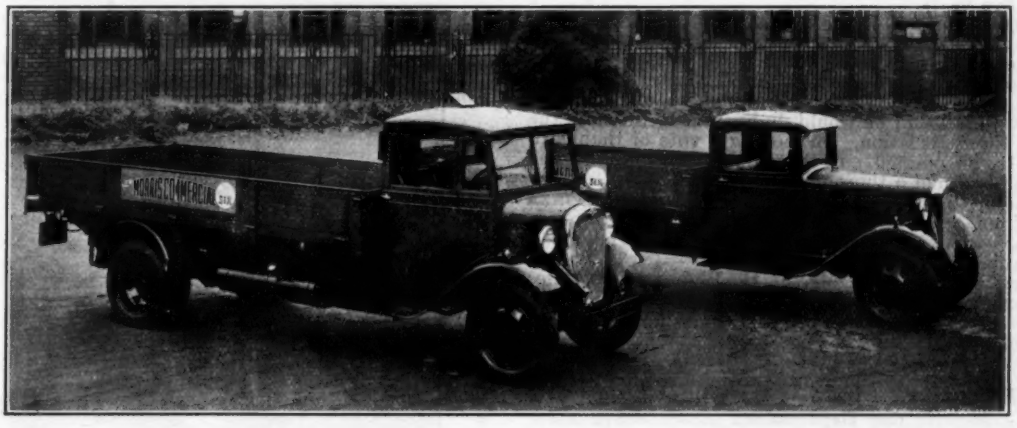
For supplying the vehicle with compressed gas a charging station is, of course, necessary, and a description of this plant is given. This consists of a compressor which takes gas from the mains and compresses it to 3000 lbs. per sq. in., at which pressure it is stored in large cylinders. From these storage cylinders it is delivered into the vehicle cylinders through an automatic device, which reduces the pressure to 3000 lbs. and safeguards the vehicle cylinders against the possibility of excessive pressure. Connection with the vehicle is made through a flexible pipe, and the time taken to fill is normally from two to four minutes.

Important particulars are given of Messrs. Vickers-Armstrong's "Vibrac" steel cylinders for gas traction purposes, the salient features of which, in accordance with the Home Office Regulations, are:

(1) They are capable of containing gas at a pressure high enough to enable a sufficient quantity of gas to be carried.
(2) They are light in weight.
(3) They do not shatter or fly into fragments if they are damaged by accident when containing gas at their working pressure.
(4) They are made of a material which will not deteriorate structurally through repeated application of load or vibration.

Full specifications of the various types of cylinder are included, together with the methods of manufacture and testing. The system has been developed, state the firm, to a stage where it is definitely successful commercially, with the result that this publication is of particular interest and value to the Gas Industry.

Morris-Commercial Advanced Design



TWO OUTSTANDING EXHIBITS IN THE MORRIS-COMMERCIAL SHOW VEHICLES.

The first is a 3-ton forward control lorry, and behind is the long wheelbase normal control 2-ton lorry.

The new range of Morris-Commercial vehicles of 30-cwt. to 3-tons capacity introduced earlier this year will make their first appearance at Olympia in November. Here we have a group of new vehicles, which will be exhibited after standing up to the crucial test of months of service in the hands of thousands of users. Road service is the only satisfactory way to prove that a design is right. Visitors to the Morris-Commercial Stand will therefore have the assurance that the advanced features exhibited are sound from both the commercial and the engineering point of view. Four-speed silent twin-top gearbox, progressive springs which automatically vary the suspension according to the load carried, triangulated frame bracing which doubles the strength of the frame at the most vital part, Lockheed hydraulic four-wheel brakes ensuring permanently equalized power application, finger-tip controls to operate dipping beam headlights and electric direction indicators—these are a few of the many proved features embodied in the new Morris-Commercial. Added to this the purchaser has the choice of four or six cylinder engine, and there are both forward and normal control models. Morris-Commercial will exhibit four models in this class in addition to other vehicles ranging from 15-cwt. to 5-tons capacity for goods carrying, and there will also be a double-deck 'bus chassis known as the "Imperial." Altogether the exhibit should prove of interest to our readers.

CONTINENTAL NOTES

AUTOMATIC REGULATOR FOR THE CALORIFIC VALUE OF MIXED GASES.

The Bulletin de l'Association des Gaziers Belges, 1933, 55, 296-302 (July-August), describes a device made by the Integra Company for maintaining a mixture of constant calorific value from two gases. The device operates in two stages. A primary adjustment is effected on the basis of the approximate mixing proportions required on the assumption that each constituent has a constant calorific value. A secondary adjustment takes care of fluctuations in the calorific values of the constituents. The secondary adjustment is controlled by means of a recording calorimeter indicating the calorific value of the mixture.

The primary adjustment comprises two co-axial ring balances connected to the offtakes of orifice plates in the mains carrying the gases to be mixed. Counterweights on the balances enable the mixing ratio to be set. Projecting from one balance is an arm situated between a pair of arms connected to the other balance. If the pressure of one of the gases alters, the angular displacement of one of the balances moves and contact is established between the single arm and one arm of the pair. This brings into operation, by means of a relay, a motor which controls a butterfly valve in one of the mains, and the correct mixing ratio is again established.

To secure control of the calorific value of the mixed gases, a sliding counterweight is provided in a radial channel in one of the balances. The recording calorimeter is so arranged that an increase in the calorific value of the mixed gases causes one circuit of a reversible motor to come into action and a decrease brings the other circuit into play. Thereby the sliding counterweight is suitably moved and the ring balance becomes displaced. The primary adjustment then regulates the control valve so as to re-establish the desired calorific value.

The connections between the various components of the regulator are thus entirely electrical. Response to variations is very rapid, and a constant calorific value is maintained in the mixed gas flowing in a main, without the need of a holder.

Midland Junior Gas Association

The opening meeting of the Midland Junior Gas Association was held on Oct. 5 at the Gas Department Recreation Room, Birmingham.

Mr. F. A. C. PYKETT, the Retiring President, who occupied the chair, welcomed the presence of Mr. R. S. Ramsden (Vice-President of the Midland Senior Association), Mr. R. J. Milbourne, and Mr. T. Campbell Finlayson, of the Woodall-Duckham Company. He congratulated the members who had come out successfully in the recent examinations, and Mr. W. T. Hobson, of Wolverhampton, upon winning the Milbourne Medal.

Mr. MILBOURNE, in presenting the Medal to Mr. Hobson, stated that as a member of the Senior Association he appreciated the opportunity of being present at the meeting. He congratulated Mr. Hobson upon the distinction he had won; he had the pleasure of working with Mr. Hobson before he went to Wolverhampton, and had first-hand knowledge of his ability.

To Mr. H. C. Wills, the late Hon. Secretary, the CHAIRMAN presented, on behalf of the members, a camera, as a small token of his able services in that capacity over a period of five years.

Mr. WILLS replied that the period he spent as Secretary was very pleasurable to him, and he appreciated highly the spirit of good will shown to him.

Amid applause, the CHAIRMAN then installed Mr. S. K. Hawthorn, of the Saltley Works, Birmingham, as President.

Mr. HAWTHORN said he would do his best to promote the objects of the Association. In moving a vote of thanks to Mr. Pykett, he pointed out that under his guidance the Association had had a thoroughly successful season.

The resolution was seconded by Mr. W. L. S. SPINKS (Birmingham) and approved; and Mr. PYKETT replied, stating that what service he had been able to render had afforded him much pleasure.

The Vice-Presidents are Mr. J. H. Wainwright (Hales Owen), Senior; Mr. F. L. Atkin (Birmingham), Junior.

PRESIDENTIAL ADDRESS

of S. K. HAWTHORN, M.Inst.Gas E., City of Birmingham Gas Department.

Until recent years, the manufacturing side of the Gas Industry received a predominance of attention in the Technical Press and in the Transactions of Gas Associations, but now the limelight is being transferred more to distribution and selling, and very rightly so. Now, while agreeing that the sales side of our Industry is most vital and does not yet receive sufficient attention, it must be conceded that manufacturing methods have certainly not reached that stage of finality at which they can be left out of the programme for the future progress of the Gas Industry.

GAS CHARGES.

As a primary factor in increasing business, efforts are continually directed towards a reduction in price to consumers. Broadly speaking, price reductions can be brought about by cheaper production and/or increased consumption, but in addition, scales of charges often require revision. Methods of charging for gas are in many cases unjust for certain consumers and insufficiently competitive. The expansion of gas business, particularly in the industrial field, has been hampered by existing legislation relating to methods of charging for gas.

The industrial uses to which gas may be adapted have been well explored, thanks to the pioneer work of a few gas undertakings, but in many districts this field is quite undeveloped. The use of gas for industrial purposes could be extended by every gas undertaking, particularly by those serving large towns, if lower rates could be charged. The establishment of Gas Development Centres, the setting up of a Central Information Bureau, the training of sales engineers, and the extension of research and publicity are most encouraging developments in industrial sales organization. Of equal importance, however, is the question of more equitable scales of charges, which difficult problem has been carefully investigated by the Gas Legislation Committee.

Quite apart from developments towards a more rational division of standing, service, and maintenance charges between all classes of consumers, it would act as a big incentive to all consumers to use more gas if a reduction in the average selling price could be effected by the combined efforts of manufacturing staffs and the salesmen.

There are two possible ways of approaching this end:

(1) Improved methods of manufacture, by which the cost of producing gaseous therms is reduced, and/or by which the residuals produced, particularly coke, become more acceptable and remunerative.
(2) Increased concentration on selling which will increase gas consumptions and/or increase the revenue from residuals, particularly coke.

These two methods, one the business of the engineer and chemist, and the other that of the salesman, should go hand in hand, and the very great importance of coke is evident. It is intended to deal with some aspects of the question of possible improvement in gas and coke production.

MANUFACTURING COSTS.

What has been done to reduce manufacturing costs and improve manufacturing methods since the war?

Manufacturing costs have undoubtedly been reduced by general mechanical improvements, by better materials of construction, by increased throughputs of carbonizing plant, by waste heat recovery with a resultant saving in total fuel, and in many cases by the introduction of continuous verticals.

THE PRESIDENT.
S. K. HAWTHORN.

Mr. Hawthorn was born in 1901, and educated at Waverley Road Secondary School, Birmingham. He matriculated in 1917—First Class Inter. Science, 1918. He joined the staff of the Birmingham Gas Department in 1918, and served two years in the Laboratories, seven years in the Drawing Office at Saltley Works, two years as Junior Engineer and Shift Supervisor at Nechells Works; and was appointed Carbonizing Superintendent at the Windsor Street Works in December, 1929. He was awarded a First Class Gas Engineering Diploma in 1929.

Manufacturing methods have been improved by a reduction of arduous manual labour, by more efficient handling of materials and by more adequate technical supervision in every way, resulting in better quality of raw materials and residuals and a regular quality of gas.

The actual production of straight coal gas therms per ton of coal, however, shows very little improvement.

There are approximately 120 volatile therms available from a ton of average gas coal, but the best carbonizing processes only recover about 75 therms as straight coal gas giving a gross gas production efficiency of 62·5%. This figure of percentage efficiency is not, however, the sole index to efficient gas making: the calorific value enters largely into the question, as will be shown later.

Gas-making efficiency on the above basis has progressed

very little during the last fifty years. The only real developments in high-temperature retorting practice have been:

1. The introduction of higher-grade refractories which have permitted higher working temperatures, shorter carbonizing periods, and very nearly complete elimination of volatile matter from the coke.
2. The simultaneous or alternate production of coal gas and blue water gas in continuous or intermittent vertical retorts.

Both these develoments were possible on account of the abandonment of the illuminating power standard, and the result has been lower calorific values and higher makes per ton, but the thermal yield of straight coal gas has not been appreciably increased.

Addition of Blue Water Gas.

The blue water gas produced in a vertical retort has very little influence on the straight coal gas made per ton, and should be ignored when computing the efficiency of straight coal gas production.

Coal gas is a mixture of high calorific value hydrocarbons with carbon monoxide and hydrogen with about 10% inert gases. This gas is commonly diluted with additional carbon monoxide and hydrogen in the form of blue water gas made either in an external generator or in the retorts themselves. This blue water gas can often be produced more cheaply per therm than straight coal gas. The extent of dilution is limited by the declared calorific value, which in turn has been chosen with due regard to distribution costs, consumers' requirements, residuals revenue, and gas production costs. The actual volume of blue water gas added to the straight coal gas from a ton of coal to make a mixture of any given calorific value depends not only on the total therms of coal gas, but also on the calorific value. Thus:

13,043 c.ft. per ton at 575 B Th.U. per c.ft. = 75·0 therms, and
13,636 ,, ,, 550 ,, ,, = 75·0 ,,

If both these gases are diluted with blue water gas at 290 B.Th.U. per c.ft. to make gas of 475 B.Th.U. per c.ft., the result will be:

13,043 c.ft. at 575 + 7052 c.ft. at 290 = 20,095 c.ft. at 475 = 95·45 therms
13,636 ,, 550 + 5529 ,, 290 = 19 165 ,, 475 = 91·03 ,,

This shows an advantage of 930 c.ft. and 4·4 therms per ton in favour of the higher calorific value coal gas. It is therefore obvious that where dilution of straight coal gas with blue water gas is found profitable, the aim should be towards high calorific value of the coal gas, in addition to high thermal yield per ton.

The above figures illustrate very forcibly the potential loss which may result from a high percentage of inerts. A comparatively low calorific value may not, however, be due to high inert content, but to a low yield of hydrocarbons. The thermal value per ton and the calorific value of the enriching hydrocarbons are the true index to gas making efficiency, and in this direction lie possibilities of improvement.

Carbonization and "Cracking."

When coal is destructively distilled at high temperatures, until no further gases or vapours can be driven off, about 60% of the original therms in the coal remain in the solid state as coke and retort carbon. The remaining 40% of potential heat value leaves the retort in a gaseous state as hydrocarbons, CO_2 and H_2. The hydrocarbons are a mixture of permanent gases and condensable vapours, and most of the latter appear subsequently as tar. The proportions of permanent gases and condensable vapours depend upon the method of carbonization and the treatment of these gases and vapours before they leave the retort. The term "cracking" is very familiar in this connection, but the varying degrees of "cracking" which occur in different methods of carbonizing are not as fully realized as they should be.

It is essential that the tarry vapours should be decomposed or "cracked" by heat-treatment while still in the "nascent" condition to obtain the most satisfactory yield of permanent gas. "Over cracking" is caused by exposing the gases and vapours to too high a temperature and results in some of the hydrocarbons being completely decomposed into hydrogen and carbon, which latter appears either as scurf, as free carbon in the tar, or as deposited carbon in the coke. "Under cracking" means inadequate heat-treatment and allows some of the hydrocarbons to leave the retort as complex compounds which condense as oils and tars, instead of being decomposed into permanent hydrocarbon gases. Apart from "cracking" of vapours, it is also possible for permanent hydrocarbon gases to be decomposed or to enter into undesirable chemical combination by adverse heat conditions in the retort.

The ideal would be so to control the cracking of hydrocarbon vapours as to render them all permanently gaseous without degrading them to carbon and hydrogen.

It has been concluded by several investigators that in addition to heat-treatment at the correct temperature, the presence of hydrogen has a beneficial effect on cracking.

Now consider the treatment which the volatile products of coal carbonization (gas and tar) undergo in the two types of high-temperature carbonization used on gas-works to-day—viz., intermittent carbonization in horizontal or vertical retorts, and continuous vertical carbonization. Horizontals and intermittent verticals differ only slightly in that there is a small free space over the coal in horizontals.

Intermittent Carbonization.

When an intermittent retort is charged, there is an almost immediate evolution of a large volume of gas. Much of this gas is of a primary nature and to a certain extent condensable. Little cracking can take place as the volume of gas is large, and for the time being there is no red hot coke in contact with the gas to cause cracking. It is probable that at this stage the tar formed is rich in paraffins, oily in nature, and of low specific gravity, with very little free carbon. As carbonization proceeds and a skin of coke develops round the charge, the gases evolved become subject to contact with red hot coke with more adequate cracking. This skin of coke gradually increases in thickness, during which time the volume of gas is gradually diminishing, until over cracking takes place owing to the increased thickness of red hot coke through which the gas must pass, and the longer time contact on account of a reducing volume of gas.

Towards the end of the carbonizing period, the gas from the now small coal core is excessively degraded. Hydrocarbon gases are practically absent, but certain high-temperature products, such as naphthalene, benzene, and carbon disulphide, are formed; the tar is now of high specific gravity and high free carbon content, but little in quantity.

It is obvious, therefore, that carbonizing conditions in an intermittently charged retort change gradually from initial conditions of under cracking, through a stage of adequate cracking, to later conditions of excessive degradation. In spite of the irregular nature of this intermittent process of carbonization, it is usual to obtain 70-75 therms of straight coal gas per ton.

Continuous Carbonization.

Coal travels slowly into the hot zone of a continuous vertical retort and a certain amount of low-temperature carbonization must take place, as is evident from the products obtained. The tar is of low specific gravity, low free carbon content, and contains more paraffins and less aromatic compounds than intermittent tar. The gas contains less benzene and its derivatives, and less naphthalene, while hydrocarbons are less in the gas, probably on account of their presence as more complex liquid compounds in the tar. Scurf formation is also less in a continuous vertical retort; it is certain that there is a greater total weight of scurf in a modern horizontal retort after six weeks' working (having carbonized, say, 63 tons of coal) than there is in a 7-ton continuous vertical retort after 9 days' working.

The throughput of continuous vertical retorts has some influence on cracking; within limits the degree of cracking increases with throughput. This may be explained by the fact that, at high throughputs, uncarbonized coal exists well down the retort in the centre of the charge and a portion of the gas has to ascend through a greater depth of red hot coke than is the case with a low throughput.

Intermittent and Continuous Carbonization Contrasted.

The essential difference between the carbonizing processes in intermittently charged retorts and continuous verticals is that more or less constant conditions obtain in the continuous process. The fact, however, that these constant conditions are far from ideal is amply proved by the inferior thermal yield of straight coal gas compared with that from the irregular process of intermittent carbonization. It is, perhaps, not sufficiently realized that the therms of straight coal gas per ton of coal vary between 2 and 10 therms less from continuous verticals than from intermittent carbonization. This deficiency is always masked by the returns of make per ton and thermal yield on account of the presence of blue water gas produced, either intentionally by steaming, or unavoidably by water quenching within the bottom ironwork. For any given calorific value, horizontals *plus* outside blue water gas will give higher therms per ton than steamed continuous verticals carbonizing the same coal.

In spite of the fact that intermittent carbonizing conditions cause more degradation than would be ideal, the thermal yield per ton clearly indicates that intermittent retorts err less on the side of overcracking than do continuous verticals on the side of incomplete cracking of tarry vapours.

It must not be inferred that the preceding remarks are intended to condemn continuous verticals—very far from it. It must be realized that gas manufacture must be judged from its economic aspect, and therefore high

thermal yields obtained at high cost may not be able to compete with lower thermal yields derived from a more logical process by which coal feeding and quenched coke extraction are continuous and simultaneous.

When such items as labour costs, working conditions, absence of smoke and steam, flexibility of gas volume, and calorific value, ease of blue water gas addition, and coke quality for certain purposes, are taken into consideration, continuous verticals must command the most serious consideration in almost every contemplation of new gas-works carbonizing plant.

Nevertheless it should be possible so to improve carbonizing methods that a plant giving every practical advantage in working should also return the highest possible yield of straight coal gas therms.

Non-Uniformity of Carbonizing Methods.

With present methods of carbonization, the treatment of coal in different parts of the retort or at different stages during the carbonizing period is not uniform, nor is the cracking of vapours evolved under control. The non-uniformity of our carbonizing methods has been fully realized for many years, and much work has been done by various workers in the realm of controlled cracking; but so far, no actual retort setting appears to have been built with this end prominently in view.

It is not intended to discuss what has been done by various workers or to indicate how that work might eventually be applied and developed. Sufficient has been said to justify what was stated earlier in this address—namely, that carbonizing methods have not reached finality, and there is ample scope for progess in the future.

It will be of interest to quote from the Cantor Lectures delivered in 1911 by the late Prof. Lewes: " There is not a single factor of uniformity in our ordinary methods of carbonizing, and there never will be with most of the proposed new processes. . . . The ideals to be attempted in a perfect carbonizing process are uniform treatment of every particle of coal distilled, a uniform treatment of the whole of the gas, and, what is perhaps as important as anything, preventing the degradation of valuable hydrocarbons by contact with hot coke or other surfaces."

Again, in the Cantor Lectures of 1924, Mr. E. V. Evans described the treatment of the gases and vapours evolved within a horizontal retort in the following words: " Whereas the gauntlet to be run by the volatile matter during the early stages of carbonization was drastic, at later stages every bubble of gas produced must fight its way through tar and other semi-liquid products, until it finds a means of exit through the innumerable channels of the partly or fully cokified mass. Each step it takes brings it into a hotter zone and the gas molecule which we imagine started from the centre of the charge with a wonderful degree of complexity is so squeezed and pushed and heated and washed that by the time it finds its way through the coke it has been reduced to an appreciably simpler form. Even then it has to run the gauntlet of the space above the top of the charge."

In spite of the stress laid in these quotations on the drastic treatment given to gases in high-temperature retorts and the necessity for preventing over-degradation of hydrocarbons, it is very necessary that the gas molecules as evolved from the coal should receive sufficiently severe heat treatment before leaving the retort if the maximum yield of gaseous therms is to be obtained. Inadequate heat treatment will result in more therms of tar and less therms of gas.

Coke.

Coke is of the greatest importance to the Gas Industry with present methods of gas manufacture, on account of its influence on the net cost of coal. To achieve independence of the coke market, the Gas Industry would have to aim at complete gasification and become practically an all-gas industry. In this case, the calorific value of the gas would be so low and the specific gravity so high as to render the distribution of the present and increasing consumptions of gaseous therms extremely expensive and difficult, particularly in the older, thickly populated parts of large towns. There would seem to be more justification for concentrating on the production of a type of coke which would be in every way as acceptable as raw coal for open fires and superior in its freedom from smoke. It may then be that calorific values of gas may be profitably increased, thereby increasing the thermal capacity of existing mains and allowing distribution expenditure to lag behind increased consumptions of gas.

Few gas undertakings are in the happy position of having a local outlet for the whole of their coke, and consequently, in the majority of cases, the average delivered price received per ton of coke is considerably below the local selling price. It should be possible to obtain a higher average return per ton, at the existing local prices, if coke could be made more suitable for existing open grates.

Of the total coal mined annually in Great Britain, the Gas Industry carbonizes 10%, while domestic uses account for 25%. On the basis of 10 cwt. of coke for sale per ton of coal carbonized (a figure well in excess of the average) gas coke total *production* for all purposes is even now only equivalent to one-fifth of domestic coal *consumption*.

Undoubtedly great strides have been made since the war in improving coke quality and in extending its uses. Coals are considerably lower in ash content, coke is drier and in most works is now carefully graded into various sizes to suit distinct purposes. On the sales side, each type of customers' requirements has been ascertained and studied, and special grates have been introduced to burn coke with full satisfaction.

In spite of all that has been done to popularize coke, however, it has to be conceded that the older types of open grates which exist in a large proportion of houses are not eminently suitable for burning ordinary high-temperature coke, and selling efforts alone can hardly lead to a satisfied use of coke in those grates. Any attempt at a general replacement of these grates by specially designed coke grates could only meet with partial success.

A point of importance in competition with raw coal is the lower specific gravity of coke, which entails more frequent feeding of fires. The production of a more readily ignitable coke than formerly by continuous vertical carbonization has been accompanied by a further reduction in specific gravity.

The Gas Industry must pay still more attention to coke in order to reduce the price of gas. An alternative policy of adopting complete gasification and ceasing to produce coke for sale, which is sometimes predicted as the future trend of the Gas Industry would involve increased volumes of gas for the same therms and would probably lead to such increased costs for works plant, storage accommodation, and distribution, as to increase the cost to the consumer and reduce business.

A further alternative may lie in the production of two types of coke by gas-works—one, coke as we now know it, which has many applications which can be maintained and probably increased, and the other, a fuel, heavier than coke, which will burn readily and smokelessly in any grate which will burn raw coal. The latter fuel would require a name, general in application, and yet bearing no resemblance to the word " Coke." If possible, such a fuel should also be very distinct from coke in appearance.

Such a policy has been adopted to a certain extent at Liverpool by Mr. R. E. Gibson, the immediate Past-President of the Institution of Gas Engineers, by a modified process of horizontal carbonization using blended coals. There may be other methods of carrying out that policy—methods which, in addition to producing a new fuel, would approach, more nearly than present high-temperature carbonization, the ideal of a perfect carbonizing process.

This is no veiled advocacy of low-temperature systems of carbonization, none of which has, as yet, been a proved success economically as a gas-works carbonizing plant; but several low-temperature plants have been installed at gas-works for experiment and research.

The Gas Industry has something to learn from low-temperature carbonization in more uniform treatment of coal. It may well be that low-temperature carbonization will eventually find a place, on economic grounds, in town gas manufacture.

The large amount of experiment and ingenuity which investigators have applied to low-temperature processes has been largely the result of economic difficulties and competition in the markets for all their products. If high-temperature processes had met with similar adverse circumstances during the last fifty years, a higher stage of development would have been reached to-day. Gas can maintain and increase its sphere of application only against keen competition, and, to progress, it must improve its business efficiency, and on the production side aim at a higher efficiency of gas production and a nearer approach to the demands for an ideal, solid smokeless fuel for open grates.

Conclusion.

The Gas Industry is in an enviable position compared with its competitors. The heat units distributed as gas and coke are derived from home resources by a direct process not subject to excessive fundamental thermal losses, and yet that process may be further improved.

Much of our business is unassailable at present prices, while the potentialities for increased business are enormous. Aided by scientific selling, those potentialities can assume reality.

We should look forward with confidence to cheaper production, lower prices to consumers, and inceasing demand for our main product—gas.

Vote of Thanks.

A vote of thanks was passed to the President. The remainder of the evening was, in accordance with practice on the opening night, spent in social intercourse.

Scottish Junior Gas Association (Eastern District)

The Opening Meeting of the 30th Session of the Scottish Junior Gas Association (Eastern District) took place in City Chambers, Dunfermline, on Saturday, Oct. 7, when members attended to welcome Mr. WILLIAM SCOTT, Engineer and Manager, Tillicoultry, to the Presidential Chair.

Mr. D. WARDEN, Dundee, in vacating the Office, thanked the Council and members for their loyal support during the past session. He congratulated them on their choice of Mr. Scott as the new President, and wished him every success and support in his new duties.

Mr. SCOTT, in taking the chair, said that he hoped to maintain the high standard set by Past-Presidents.

Mr. Warden was presented with a barometer, suitably inscribed, in recognition of his services to the Association, and it was hoped that he would have many happy memories of the past year, and continue his enthusiastic support of the Association.

Sympathetic reference was made to the decease of Mr. R. R. Linley, Leven, and Mr. Spence, West Wemyss, and their passing was observed by the members standing in silence.

The annual Paperette Competition Prizes for the past session, in the form of technical books, were presented to:

1. William Masterton, B.Sc., Granton Gas-Works.
   "A New Automatic Cut-Off for Calorimeters."
2. David Gardner, Gas-Works, Alloa.
   "Water Softening and Boiler Practice."
3. C. D. Blackhall, Edinburgh Corporation Gas Department.
   "The Testing of Gas Fittings and Meters."

It was gratifying to record that ten of the members had gained Institution of Gas Engineers' Certificates. Mr. T. P. Napier was awarded the Silver Medal in Minor Gas-Works Practice in the City and Guilds Examination, and Mr. W. N. Baird, the B.Sc. in Mechanical Engineering.

GAS MANUFACTURING PLANT FOR A SMALL WORKS.

PRESIDENTIAL ADDRESS

of W. SCOTT, Tillicoultry.

In dealing with this subject, the size of works I have in mind is one making about 30 million c.ft. of gas per annum.

It may occur that an engineer wishes to install new carbonizing plant or modernize existing plant, and I wish to deal with, in a general way, horizontal retorts, horizontal retorts and water gas plant, carburetted water gas plant, vertical retorts, and complete gasification plant.

One factor to be considered is flexibility coupled with floor space required. A setting of horizontal retorts, as a unit, does not lend itself to flexibility, or, in other words, it is not a simple matter to adapt production from a horizontal retort setting to meet the various loads required throughout the year. A space of three to four days is generally required before a bench can be put into working order, and, at times, the benches in operation are working at only part capacity. This entails considerable waste.

When a water gas plant is used in conjunction with a horizontal retort setting, flexibility is greatly enhanced, due to the ease and speed with which output can be regulated from a water gas plant. The capacity of the plant is also greatly increased with very little additional floor space. A carburetted water gas plant is very flexible, production and quality being varied, with the minimum of time and labour, to meet requirements, while the floor space required is very small compared with capacity. These remarks may also be applied to a complete gasification plant. Results have shown that vertical retorts are very flexible, in regard to both quantity and quality of gas required, and the floor space is low in comparison with output. In connection with the floor space required for various plants, I quote figures given in "Modern Gas-Works Practice," by Alwyn Meade, where he states that for horizontal retorts the average yield of straight coal gas is 200 to 250 c.ft. per sq. ft. of ground area, and for vertical retorts the figure may be increased to as much as 475 c.ft., while with carburetted water gas plants the ratio of areas, compared with an equivalent coal gas plant, may be as great as 9 to 1.

At the present time markets for residual products are poor. Within the last few years coke prices have dropped considerably, and with the advent of new, large low-temperature carbonizing plants, making large quantities of smokeless fuel, there is little prospect of coke regaining its former price level. Tar, since the commencement of the Co-operative Tar Scheme, has obtained a fairly fixed market, but also has depreciated in value. Ammoniacal liquor, once looked upon as a good source of revenue, is now treated as a waste product, entailing expense, in some cases, to have it disposed of.

It is thus necessary to consider the effect any new plant would have on residuals. Taking general figures, we have horizontal retorts yielding 58 therms, 8½ cwt. of salable coke, and 12 gallons of tar per ton of coal carbonized; vertical retorts yielding 76 therms, 6½ cwt. of salable coke, and 17 gallons of tar per ton of coal carbonized; complete gasification plants yielding 150 therms and 8 gallons of tar per ton of coal carbonized. Using a water gas plant in conjunction with horizontal retorts and using a judicious mixture of cannel and gas-making coals, the salable coke figure may be considerably reduced—say, 5 cwt.—with 90 therms and 9 gallons of tar per ton of coal carbonized.

The return for residuals is reflected in the price of gas charged to the consumer. With this in view, what is the policy to be pursued? Concentration on yield of therms per ton as obtained by a complete gasification plant or carburetted water gas plant, a lower yield of therms per ton with a proportionate quantity of residuals as obtained from horizontal retorts working in conjunction with a water gas plant, or a lower yield of therms per ton with an increased yield in residuals as given by vertical retorts?

THE PRESIDENT,
WILLIAM SCOTT.

The quantity of gas to be supplied requires consideration. The general value of gas supplied when working a unit of horizontal retorts is 500 B.Th.U. per c.ft. In some instances, this value may be considered too rich, and the only method of reducing is by the admission of producer gas, which is not recommended. With a water gas plant running in conjunction with a setting of horizontal retorts, the value may be varied to suit requirements by the simple adjustment of the ratio of water gas to coal gas. The value of gas from vertical retorts may be altered to meet requirements by the adjustment of steaming, and also, in the case of carburetted water gas, the value may be altered by regulating the quantity of gas oil used. The gas produced from a complete gasification plant has a value of 350 to 370 B.Th.U. per c.ft. This value may be considered

too low, but there are instances where the use of this quality of gas is meeting with success.

In the following calculations of cost of production, coal has been taken as costing 17s. 6d. per ton delivered at the works, coke 16s. per ton at works, and tar 35s. 6d. per ton, or 2d. per gallon, at works. In cases where the coke salable per ton of coal carbonized has been given as approximately 5 cwt., the selling price has been taken at an average of 20s. per ton. It will be appreciated that with a restricted production of salable coke a higher price per ton will be obtained. In the case of carburetted water gas and complete gasification plants, the steam costs may be considerably lowered if the plant installed is fitted with a waste-heat boiler. Also taking into account the short time required to get these plants into operation, it would be possible for some considerable part of the year to make sufficient gas during 16 hours to carry over 24 hours. Where the installation of a carburetted water gas plant is considered, coke required for the plant would have to be purchased. Having this in view, an average price of 18s. per ton of coke delivered at works has been taken.

With horizontal retorts, the calculations are worked out on the basis of 1 ton of coal yielding 11,500 c.ft. of gas of 500 B.Th.U., 8½ cwt. salable coke, and 12 gallons tar.

With vertical retorts, the returns from 1 ton of coal are taken as being 13,500 c.ft. of gas of 500 B.Th.U., 7½ cwt. salable coke, and 14 gallons tar; 16,500 c.ft. of gas of 450 B.Th.U., 6½ cwt. salable coke, and 17 gallons tar; 22,000 c.ft. of gas of 400 B.Th.U., 5 cwt. salable coke, and 20 gallons tar.

With a carburetted water gas plant the calculations are based on 1 ton of coal yielding 56,000 c.ft. of gas of 300 B.Th.U., and requiring 2 gallons of oil to raise the value to 500 B.Th.U.

With a complete gasification plant the returns from 1 ton of coal are taken as being 42,000 c.ft. of gas of 360 B.Th.U. and 8 gallons of tar.

In considering horizontal retorts and a water gas plant, the calculations are based on 13,200 c.ft. of gas of 500 B.Th.U., 12 gallons tar, and 7½ cwt. salable coke per ton of fuel (coal and coke) used, and 17,000 c.ft. of gas of 450 B.Th.U., 9 gallons tar, and 5 cwt. salable coke per ton of fuel (coal and coke) used.

HORIZONTAL RETORTS.—500 B.TH U. GAS.

Coal	18·3d.	per 1000 c.ft. gas made
Wages	6·3d.	,, ,,
Maintenance	1·0d.	,, ,,
	25·6d.	,, ,,
Less residuals—		
Coke 7·1		
Tar 2·1		
	9·2	
Net cost	16·4d.	per 1000 c.ft. gas made
,,	3·3d.	per therm

VERTICAL RETORTS.

—	500 B.Th.U.	450 B.Th.U.	400 B.Th.U.
	Pence per 1000 C.Ft. Gas Made.	Pence per 1000 C.Ft. Gas Made.	Pence per 1000 C.Ft. Gas Made.
Coal	15·5	12·7	9·5
Wages	4·6	4·6	4·6
Maintenance	0·7	0·5	0·4
	20·8	17·8	14·5
Less residuals—			
Coke 5·3		3·9	2·7
Tar 2·0		2·1	1·8
	7·3	6·0	4·5
Net cost	13·5	11·8	10·0
	Pence per Therm	Pence per Therm	Pence per Therm
,,	2·7	2·6	2·5

CARBURETTED WATER GAS.

—	500 B.Th.U.	450 B.Th.U.	400 B.Th.U.
	Pence per 1000 C.Ft. Gas Made.	Pence per 1000 C.Ft. Gas Made.	Pence per 1000 C.Ft. Gas Made.
Coke	3·9	3·9	3·9
Oil	10·0	7·5	5·0
Wages	3·4	3·4	3·4
Steam	1·4	1·4	1·4
Maintenance	0·2	0·2	0·2
Net cost	18·9	16·4	13·9
	Pence per Therm.	Pence per Therm.	Pence per Therm.
,,	3·8	3·6	3·5

HORIZONTALS AND WATER GAS.

—	500 B.Th.U.	450 B.Th.U.
	Pence per 1000 C.Ft. Gas Made.	Pence per 1000 C.Ft. Gas Made.
Coal and coke	15·8	11·7
Wages	5·0	5·0
Steam	0·4	0·8
Maintenance	1·2	1·2
	22·4	18·7
Less residuals—		
Coke 5·5		3·5
Tar 1·8		1·0
	7·3	4·5
Net cost	15·1	14·2
	Pence per Therm.	Pence per Therm.
,,	3·0	3·1

COMPLETE GASIFICATION.—360 B.TH.U. GAS.

Coal	5·0d.	per 1000 c.ft. gas made
Wages	3·4d.	,, ,,
Steam	0·8d.	,, ,,
Maintenance	0·3d.	,, ,,
	9·5d.	,, ,,
Less residuals—		
Tar	0·4d.	,, ,,
Net cost	9·1d.	per 1000 c.ft. gas made
,,	2·5d.	per therm

The capital expenditure involved in erecting any new plant must also be taken into consideration. The estimated capital values of installation, including buildings and other expenditure incidental to the installation may be taken as being: For vertical retorts, £10,000; for water gas plant, £2000; for carburetted water gas plant, £2500; and for complete gasification plant, £2000. If capital charges, including depreciation, are taken at, say, 10%, this would mean 8d. per 1000 c.ft. gas made for vertical retorts; 1·6d. per 1000 c.ft. gas made per water gas plant; 2·0d. for 1000 c.ft. gas made for a carburetted water gas plant; and 1·6d. per 1000 c.ft. gas made for complete gasification plant. Where a carburetted water gas plant or a complete gasification plant is installed, the erection of a standby would have to be considered, and with the installation of a water gas plant provision for a relief holder would require consideration. Other factors may be involved in considering the erection of new plant, but these are more or less of a local nature.

Discussion.

Mr. SYDNEY SMITH (Dunfermline) agreed that both C.W.G. and vertical plant afforded flexibility, but suggested that to rely on a C.W.G. plant as the only means of production would be to depend too much on the cost of coke, which was less stable in price and quality than coal. A mixture up to 30% C.W.G. was permissible without seriously affecting the quality of the gas.

Mr. SCOTT agreed that a C.W.G. plant in a gas-works of 30 million c.ft. per annum output was not capable of producing as cheap gas as some other types, though he favoured it, in conjunction with horizontals, as the ideal combination. If the consumers could be educated to a low C.V. gas, complete gasification was a suitable plant, giving appliances capable of adjustment.

Mr. D. GARRIE (Burntisland) considered that too narrow a view had been taken in the paper to assess accurately the best plant. He stressed the need for constant C.V. and specific gravity as well as flexibility, with ground space as of secondary consideration. The type of plant should be chosen in relation to the output per mouthpiece, and maximum and minimum demand, so that maintenance costs could be kept low. Capital expenditure would, however, be the predominating consideration, as it had such a large influence on the cost of gas in small undertakings. He maintained that in a horizontal and water gas combination, the horizontals were the flexible unit. Complete gasification plant was the most flexible, and had a low capital cost, but he observed that the cost of gas in such works was not outstandingly low, as might be expected from Mr. Scott's figures.

Mr. SCOTT suggested that the question of gas quality could not get the attention it deserved in a works where the manager had everything to attend to.

Mr. DICKSON (Cowdenbeath) thought that horizontals could be made sufficiently flexible by altering the class of coals, also that complete gasification plants were not adopted in larger works due to the large quantities of effluent and the difficulty in disposal. Up to 60% water gas could be used, and to keep down capital expenditure the gas could be passed directly into the foul main, and so dispense with a relief holder, if the main holder had a fair capacity.

Mr. COWIE, Jnr. (Hawick), favoured a complete gasification as the plant was not dependent on the residual market prices, but only on coal. Capital was low, quality constant, and low C.V. worked satisfactorily.

Street Lighting of Paris*

By J. W. Partridge, Chief Engineer-in-Charge of Street Lighting of Paris.

Paris has—leaving out of consideration its two great public parks—well-defined boundaries, and is roughly circular in shape. The city measures 7½ by 6 miles and covers about 21,000 acres. These boundaries have not been extended since 1859 except for the recent inclusion of a narrow strip all around the city.

Extensive suburbs have been developed outside these boundaries, but these are still under local administration.

As a result, Paris has become most intensively and uniformly built up. Houses are usually seven or eight stories high, the maximum height allowed by building regulations, and on its 658 miles of streets a nearly unbroken front is presented, private gardens being practically unknown.

House fronts are built of limestone or sometimes of brick, and old houses have a coating of plaster of Paris. These house fronts are compulsorily cleaned every ten years and are of a rather light grey colour, the air being not too heavily tainted with smoke and soot. They thus afford a fairly good background for the street lights.

Some streets are very narrow, certain boulevards are very wide; but most streets are 40 ft. wide, including sidewalks, and are rather irregularly laid and spaced.

Balconies, shutters, sunshades, shop fronts, and commercial signs are allowed to protrude from the house fronts and part of the sidewalks may be used by shops or taverns. Wide streets and open spaces are almost always planted with trees.

The streets of Paris are not all of a busy character, but there is not so great a difference between streets as in most other cities. There is no sharp separation of business centre, industrial and residential districts. There are, of course, districts devoted primarily to business and industry or to residences, but in general the separation is effected rather in horizontal planes—*i.e.*, the lower stories of houses are commonly given up to offices, shops, or small factories, and the upper stories consist of residential flats. The density of population is high (one inhabitant for 1 ft. 2 in. of street).

These conditions affect the lighting of the streets in two ways. Street lights are rarely the only lights on the street and rarely the most objectionable source of glare; further, as most streets, even in remote districts, carry active motor and pedestrian traffic, a black wear resisting surface is usual, just where good visibility is most necessary.

A high standard of illumination must then be maintained when the streets are busiest, up to 8.15 p.m. or 12.15 a.m., while a lower degree is sufficient during the rest of the night, when the streets are empty and obstructions more easily detected.

Another consequence of Paris having had fixed boundaries for a long time is that only few new streets are opened up every year—either by cutting up large blocks or by widening old streets. Most streets are half-a-century old and have always been well lighted according to the standards of the times. A few decades ago they were provided with lamp posts using flat-flame gas burners, which, being of low intensity and having an unfavourable light-distribution, required to be rather closely spaced—*i.e.*, about 80 or 100 ft. apart. By making use of the incandescent burner, and later of clusters of small inverted mantles, this gas lighting has been improved without major alterations of equipment so as to meet fairly satisfactorily the increasing requirements of night activities and traffic.

The problem in Paris is thus not of how to light streets, but how to light them better and more efficiently when illumination with the existing equipment is deemed insufficient.

This problem had been set for some time before the war for a few main thoroughfares and places, where ordinary electric arc lamps and afterwards enclosed electric arc lamps were used with some success. The quality of the illumination so obtained was not above reproach. Excessive glare, flickering, and unevenness of colour were present and have proved serious drawbacks. High-pressure gas lamps, which were then developed, proved more popular and for a time were exclusively adopted in new installations.

All development of street lighting had to be stopped during the war and for some time afterwards, being greatly reduced first as a protection against air raids, and then in order to save money and coal.

When, with conditions more or less normal, work was resumed in 1921, a new light-source of high intensity, the gas-filled incandescent lamp of 500 watts or more, had come into practical use. For a time incandescent electric lighting and high-pressure gas lighting have been developed side by side.

Improvements made in the durability and efficiency of electric incandescent lamps, the development of more adequate fixtures, and the progressive cheapening of electricity have, however, turned the scales in favour of electric light in Paris, high-pressure gas being retained, but no longer extended since 1926.

This changing over of the street lighting of Paris is still going on and will probably go on until all streets are provided with what we still call " intensive " (but might more justly term merely " adequate ") illumination, so great has the demand for good lighting become.

Gas Lighting.

Gas is supplied in Paris through a network and gas-works owned by the City and operated by a private Company, the Société du Gaz de Paris. Gas mains are laid in practically every street and run more often than not under both side-walks, making the feeding of gas light a comparatively easy and inexpensive matter. Gas is of constant declared calorific value of 505 B.Th.U. per c.ft. and the pressure, although allowed to vary from 1½ to 4 in. of water, is, in fact, approximately constant, the network being fed at several points from high-pressure feeders through automatic governors. It has thus been found possible to do without governors to regulate the supply of gas to the burners, and so avoid the attendant expense and trouble.

All burners have been for thirty years of the incandescent type, upright burners being originally used. All such burners have a consumption of 2·82 c.ft. of gas per hour, which has been found to give the best results. All burners with higher consumption and clusters of two or three upright burners which were more powerful but less efficient have been replaced by inverted burners.

They are placed in square or round brass lanterns with china reflectors on two types of posts. One of these is a vertical pillar 9 ft. high, set up near the edge of the sidewalk, and is used wherever the width of the sidewalk is greater than 8 ft. The other is a vertical column with a bracket and is slightly higher (10 ft.). It is set up close to the house front and takes much less useful space. Lights are staggered and from 80 to 100 ft. apart. Lighting is turned on and off automatically through hand-wound clocks, which also open and close a by-pass at the proper time. Pointers on the clocks are set every week so as to follow the time tables closely.

This type of gas lighting has given excellent service and is still temporarily retained for lighting the less important streets. The conversion to inverted burners is still continuing, but only as fast as inverted burners already used in other streets are made available through the installation of electric light. In this way expenses are kept from rising too sharply and a sufficiently long, useful life is secured for the inverted burners. The number of upright burners still in use was 8386 at the end of 1932.

Inverted burners are used on the same pillars and are all enclosed in round lanterns which were already in use or made available through the installation of electric light in other streets. The old square lanterns, being somewhat smaller, were found unsuitable for inverted burners through overheating of the glass panes and subsequent breakage.

The standard inverted burners are provided with 5 nozzles on the underside of a flat circular aluminium box acting as a preheater. Four of the nozzles form a square and the fifth is at the centre and somewhat lower, the gas consumption being 1·76 c.ft. per hour per nozzle. The preheater is divided in two compartments by a vertical partition, one feeding two nozzles and the other three nozzles, including the central one. The mixture of gas and air is fed to the preheater from above through pipes rising along the sides of the lantern; the injectors being placed in an upright position close to the underside of the reflector and easily accessible. Gas is controlled by a clockwork controller at the base of the lantern from which also rises a thin copper pipe acting as a by-pass for the pilot jet using ⅛ of a cubic foot per hour and burning only during the day.

All mantles are lighted at dusk; three are automatically burned out by the controller at 9.15 p.m. or 12.15 a.m., leaving the others to burn until dawn.

These controllers are quite satisfactory, missing at an average but once a year.

Nozzles can be easily replaced by stoppers and the ejectors changed so as to use 3 or 4 mantles only when 5

* From a paper read before the Association of Public Lighting Engineers, Margate Conference, Sept. 4 to 7.

mantles are not needed, thus allowing for a further rise of illumination in the future without any change of equipment.

The use of this inverted burner has made it possible to raise quickly and at a small first cost the level of illumination of the streets. With the five mantles in use the maximum illumination is 2 foot-candles, the minimum 0·05, and the average on the street (including sidewalks) 0·25 foot-candle.

Inverted burners having 7 mantles on the same lines are also used in special cases when a complete change of equipment with higher and more widely-spaced pillars had for some reason to be delayed.

There were in use, at the end of 1932, 13,388 lanterns with 5 mantles clusters and 280 lanterns with 7 mantles clusters.

Another type of inverted burner with a central tube and 5 mantles in a circular row, no controller or by-pass, is used as a stand-by in streets provided with electric light. These burners are enclosed in the same round lanterns and on the same type of pillar, and placed as a rule at street crossings and at intervals of not more than 100 yards. They are lighted by hand in the event of a failure of electric light; 6641 of these are already in use.

High-Pressure Gas Lighting.

High-pressure gas lighting makes use of completely different equipment. Gas is fed through a special network of mains whose length at the end of 1932 was 171 miles. The pressure in these mains is maintained at about 3 in. of water during the day and raised to 63 in. of water at lighting up time by three compression plants using revolving Roots blowers.

Lamps are provided with one, two, or three inverted burners and a pilot jet and consume from 6 to 42 c.ft. of gas per hour.

Automatic governors actuated by the change of pressure open the cocks and close the pilot jet at dusk, and do the reverse at dawn.

When more than one mantle is used provision is made for leaving only one to burn all night, the others being put out by hand or by automatic clockwork controllers of large size.

The lamps are enclosed in large lanterns, or more usually in copper domes and large blown glass globes supported by lyre-shaped carriers, or, in the vicinity of houses or trees, by swan neck brackets. These in turn are supported by cast-iron pillars, the mounting height being usually from 17 to 19 ft. and in open places up to 20 ft. 4 in.

The pillars are usually staggered with a spacing of 100 to 120 ft.

The quality of light is very good, the colour pleasant, glare not objectionable, and the working quite dependable. In a 40 ft. wide street furnished with 3-mantle lamps using 42 c.ft. per hour and 120 ft. apart, a maximum illumination of 2 foot-candles is available, the minimum being 0·2 and the average, including sidewalks 0·6 foot-candle.

The number of high-pressure gas lamps in use at the end of 1932 was 6755.

Since the advent of high-pressure gas lighting and inverted burners, no revolutionary improvement has been made in gas lighting. Any new application of this means of illumination in recent years must perforce rely on its already well-known qualities. One of these is unquestionably its dependability. Low columns with large amber globes placed at both ends of safety islands are for this reason provided with an upright gas burner. The burner is operated by a clockwork controller and, where high-pressure gas is available, is fed direct from the mains, the flame rising and falling according to the pressure, thus doing away with the necessity of using a pressure-actuated governor and by-pass.

In the same way, some safety islands in the Avenue des Champs-Elysées which had to be kept free so as not to prejudice its appearance were rendered visible at night by using hollow curbs with glass fronts and a gas burner inside.

REGISTER OF PATENTS

Pre-Heaters for Gas Purifiers.—No. 390,788.

R. & J. Dempster, Ltd., Scott, J. W., and Sheeran, A. J., all of Manchester.

No. 3292; Feb. 3, 1933.

Pre-heaters for gas purifiers usually involve the use of steam-heated tubes in a casing, through which tubes the gas passes, during normal working of the apparatus, to purifier boxes.

The replacement or repair of tubes or parts within the casing usually necessitates the complete removal of the casing, which operation not only disturbs the gas-tight joints between the casing and the inlet communications to the boxes, but also, when the operation occupies considerable time, renders the introduction of by-pass communications imperative.

The object of this invention is to provide removable heating means enabling the parts or tubes within the casing during use thereof to be attended to without the complete removal of the casing itself. In this way, not only are the flange joints between the casing and the inlet communications left undisturbed, but the facility of operation thus introduced enables the repairs or replacements to be accomplished in a minimum time, so that in some cases temporary cessation of supply of gas to the purifier boxes may be entertained without the need of introducing a by-pass device. But, instead of cessation of supply as stated, the gas may be passed through the empty casing while the operation referred to is taking place.

The tubes are supported to an inner casing which completely encloses the tubes, with the exception of the tube apertures and apertures for steam inlet and outlet; which casing, with the tubes, is capable of being wholly removed.

Water Gas Manufacture.—No. 391,603.

Humphreys & Glasgow, Ltd., and Glasgow, A. G., both of Westminster.

No. 11,369; April 20, 1932.

This invention relates to the manufacture of water gas by the usual intermittent process, where the heat-energy of the generator blast products is utilized for gasification of enriching oil, for superheating the generator steam, for production of steam, or for combination of any or all of these and other purposes. Its principal object is to provide for wide and ready control or adjustment of "waste-heat" steam production and concurrently of temperatures in the fuel bed so as to prolong the life of firebrick linings, while the water gas generator always operates efficiently for the steam production required.

The back-run process has striking advantages and economies, but its general adoption in place of the reverse-make system is due to the fact that it is uneconomical for the production of steam to consume generator carbon in excess of that required for gas making, when sufficient semi-waste fuel is available on most gas-works.

On the other hand, it is frequently the case that emergency, occasional, or brief seasonal demands for additional steam are more economically and conveniently supplied by corresponding consumption of fuel in the generator than by starting up an additional boiler with its attendant labour.

This invention provides for flexibility in "waste-heat" steam production, and according thereto the amount of steam produced is regulated to suit requirements by varying the amount of the heat previously stored in the recuperative chambers of the plant which is picked up by the gas making steam and returned to the generator instead of being carried on for use in steam production. Any desired steam production within limits may be thus accomplished by easy manipulation of the controls of two or more separated steam inlets so as to effect corresponding adjustment between the quantity of superheated back-run steam and the quantity of saturated (and/or non-back run superheated) steam admitted either concurrently or serially to the generator for the down-run; or a corresponding adjustment between the number of full back-runs and of full saturated (and/or non-back-run superheated) steam down-runs, or, again, by adjustment of the point or points of admission of some or all of the back-run steam to the oil-fixing (or recuperative) chambers. Back-run benefits are retained substantially *pro rata* to the use of back-run steam or the extent of back-running; while in all cases the exit down-run gas follows the course of the full back-run gas, whereby a considerable amount of the sensible heat formerly lost in the reverse-make down-run gas is saved, with a corresponding reduction of the cooling requirements.

In short, the invention enables heat energy in the generator blast products, readily at will, to be applied to the automatic production of steam, or returned to the generator for the production of blue water gas, whichever may be more profitable for the time being.

The "waste-heat" steam production referred to is intended to mean the steam produced by the sensible heat in the blast gases, it being assumed that the operation of the plant is so balanced that there is no combustible in these exit blast gases. If, however, sufficient surplus combustible be present, "tertiary" combustion thereof will correspondingly increase the steam production, without otherwise interfering with the operation of this invention.

Gas Purifiers.—No. 391,928.

Blakeley, W., of Church Fenton.

No. 3415; Feb. 5, 1932.

This invention relates to gas purifiers. Hitherto these purifiers, states the patentee, have been made shallow in depth in proportion to their horizontal area, and such an arrangement when involving the use of a number of purifiers placed side by side of necessity occupies a considerable amount of floor space. To save ground space and maintain the same cubic capacity, or give an increased cubic capacity, the purifiers are made

greater in depth and the number of tiers of grids for supporting the purifying material increased. A suitable elevator is provided which can be traversed from one purifier to another for delivering a charge into whichever purifier is being charged, and to simplify and enable the discharging of the purifiers to be economically accomplished the sides of each purifier are provided with doors which can be removed, or opened for allowing the fouled material to fall on to a conveyor, by which it can be carried away.

Each tier or grate is provided with an inlet valve and an outlet valve, the inlet valve openings communicating with one conduit and the outlet valve openings communicating with another conduit. One conduit is provided with a main inlet and the other with a main outlet. With this construction any of the grates, or tiers, can be put into and out of action at will, and when the purifying material on any grate or tier has become foul and interrupts the flow of gas, such grate or tier can be cut out. Reversing valves may be used for converting the outlet side to the inlet side and *vice versa*. Any number of the purifiers may be used in one installation and provided with an arrangement of valves for working them in any predetermined order and also for reversing the direction of flow of gas in accordance with the usual practice.

Vertical Retorts.—No. 395,092.

WEST, F. J., WEST, E., and WEST'S GAS IMPROVEMENT COMPANY, LTD., all of Manchester.

No. 7456; March 12, 1932.

This invention relates to vertical retorts, and has for its object a method of working which will give a dense strong coke and which will avoid the discharge of a glowing mass requiring quenching with water. A further object is to avoid escape of large volumes of gas from the carbonizing chamber when a new charge is being introduced, and to economize in the time taken for carbonizing and steaming, so that the output capacity of the plant can be increased.

The invention comprises a vertical retort having carbonization, intermediate, and cooling zones. The cooling zone has steam inlets thereto and comprises a coke discharge chamber equal in capacity to one-half or other aliquot part of the cooling zone capacity, the cooling zone being proportioned to hold the coke from a complete charge in the carbonization zone. The arrangement is such that it takes two or more emptyings of the coke discharge chamber to discharge the contents of the cooling zone, which is equivalent to the coke resulting from the carbonization zone.

The sequence of operations in the plant will be understood from figs. 1-6.

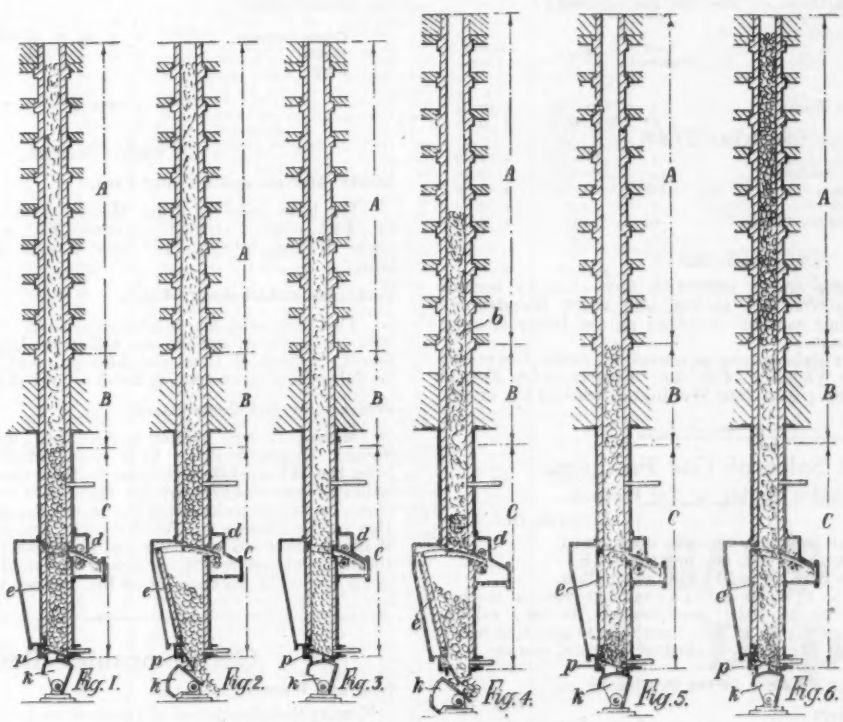
In fig. 1 the complete retort (comprising the carbonization zone A, the intermediate zone B, and the cooling zone C) is full. The zone A contains hot completely carbonized coal, the zone B some hot coke, and the zone C cool coke. The hinged wall *e* and the valve or gate *d* thereon are moved to cut the coke discharge chamber off from communication with the remainder of the cooling zone C and to enlarge the coke discharge chamber, so that the coke therein will not be held up by the sides of the chamber but will fall freely on to the plate *p* when the discharge door is opened. This position of the parts when discharge is taking place from the coke chamber is shown in fig. 2. Steaming may continue during all the stages of operation, the quantity of steam admitted being controlled to suit the conditions, being for example a minimum in figs. 1 and 2 conditions, and a maximum in the conditions shown in fig. 6.

After the contents of the coke chamber have been discharged, the wall *e* and gate *d* are returned to their original positions and the discharge door *k* is closed. If desired the latter may not be completely closed in order to permit air to escape from the coke chamber during the descent of the next charge from the upper portion of the cooling zone.

Fig. 3 shows the retort after the second filling of the coke chamber. The relative cool lower portion of coke from the intermediate zone is now in the space immediately above that which will be occupied by the gate *d* when it is again closed, and so acts to protect the gate from the hot carbonized coal from the retort. The contents of the coke chamber are again discharged, and vigorous steaming and cooling of the hot coke which is above the gate *d* commences. When the discharge is completed, the wall *e* and door *d* are again moved to charge the coke discharge chamber afresh. This is the position of affairs indicated in fig. 5. The coke from the intermediate zone now rests on the plate *p*. A new charge of coal is fed into the carbonization zone (see fig. 6), and carbonization and steaming proceed simultaneously until carbonization is completed, when the cycle of operations is repeated. As the intermediate zone always contains hot carbonized material, the water gas reaction can proceed continuously and even when there is a new charge of coal above such zone.

The steam which is admitted to the zone C effects the cooling of the coke therein, but it is converted into water gas in the intermediate zone where the necessary temperature is maintained by heat from the lowest combustion chamber *c*.

If desired, the capacity of the coke extractor chamber may be adjustable to ensure the maintenance within the retort after the cooling space has been charged of sufficient hot carbonized material to fill the predetermined intermediate zone which isolates the carbonizing from the cooling portions of the retort.



NEW FORM OF RETORTING BY WEST'S.

Gas Valves.—No. 393,627.

GAS LIGHT AND COKE COMPANY and MASTERMAN, C. A., both of Westminster, S.W. 1.

No. 34,066; Dec. 8, 1931.

This invention relates to a controlling valve for use with geysers, and has for its object to provide an improved form of valve for use in controlling the supply of gas to the main gas valve of the geyser.

According to the invention a valve is provided with a boss or nipple for the attachment thereto of a pilot jet burner, the plug of the valve at one end (preferably its upper end) being fitted with a gapped disc so that when the gap therein is aligned with the pilot burner the latter can be lit, and when the said gas is disaligned with the pilot burner access to the pilot burner is prevented. In the latter position of the gap the controlling valve is closed or a free passage is allowed through the controlling valve for a flow of gas to the main gas valve of the geyser.

GAS MARKETS & MANUFACTURES

Stock Market Report.

[For Stock and Share List, see later page.]

The news of Germany's resignation from the League of Nations was received after the Stock Exchange closed on Saturday last, so that its effect on markets will not be known until business commences this week, and doubtless some marking time period will elapse while investors take stock of the new position.

The volume of business last week was again heavy, particularly in the Industrial section, and gilt-edged stocks also received steady support. Yet another Dominion loan has met with immediate success; the lists for the South African 3½% at 98½ being open for five minutes only.

There was a good demand for Gas stocks and shares, and the volume of business was unusually heavy. It will be seen from the Stock and Share List that many issues were marked up in value, some substantially so. It is interesting to note that these improvements were by no means confined, as of late, to ordinary issues, as several preference and debenture issues also strengthened, including a 4 point increase in Tottenham 5% preference. A noticeable feature during the past few weeks has been the steady increase in Gas Light units which advanced a further 9d. to 28s., at which price the yield on a £5 12s. dividend basis is 4%.

At the time of writing there are more ordinary stocks available, and included in those on offer are the following:

Amount Offered.	—	Last Dividend.	Price.	Gross Yield.
				£ s. d.
100	Bombay £1 shares . . .	8	27s. 6d.	5 16 4
2,000	European	6*	146	5 9 7
426	Holyhead and North Wales £1 shares	4	16s. 6d.	4 17 0
10,000	Imperial Continental . .	12	220	5 9 0
9,000	South Shields	8½	177½	4 15 9
350	Wandsworth	7	157	4 9 2
438	Watford and St. Albans .	6¾	151	4 9 4

* Free of tax.

The only preference stocks offered in any quantity include £5000 South Metropolitan 4% at 103, and £3062 Wandsworth 5% (new) at 121—four months' dividend on the latter stock is payable in March next.

Among permanent debentures, a parcel of £3289 Gravesend 5% is offered at 120, yielding £4 3s. 4d.; £800 Barnsley 5½% at 130, yielding £4 4s. 8d.; and £600 Wellington (Salop) 5% at 117, yielding £4 5s. 6d.

Current Sales of Gas Products.

The London Market for Tar Products.

LONDON, *Oct.* 16.

The market for tar products remains unchanged.

Pitch is quoted at about 77s. 6d. per ton f.o.b.

Creosote continues firm at 3d. to 3½d. per gallon.

Refined tar is 4d. to 4½d. per gallon in bulk at makers' works.

Pure toluole is about 2s. 10d.; pure benzole, 1s. 9d.; solvent naphtha, 95/160, is steady at 1s. 8d.; and 90/140 pyridine bases, 4s. 3d. to 4s. 6d.—all per gallon naked at makers' works.

Tar Products in the Provinces.

Oct. 16.

The average prices of gas-works products during the week were: Gas-works tar, 30s. to 35s. Pitch—East Coast, 72s. 6d. to 75s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 72s. 6d. to 75s.* Toluole, naked, North, 1s. 10d. to 2s. Coal-tar crude naphtha, in bulk, North, 6d. to 6½d. Solvent naphtha, naked, North, 1s. 6d. to 1s. 6½d. Heavy naphtha, North, 10d. to 11d. Creosote, *ex* works, in bulk, North, liquid and salty, 2d. to 2½d.; low gravity, 2d.; Scotland, 2d. to 2½d. Heavy oils, in bulk, North, 4d. to 4½d. Carbolic acid, 60's, 2s. 7d. to 2s. 8d. Naphthalene, £9 to £10. Salts, 55s. to 75s., bags included. Anthracene, "A" quality, 2½d. per minimum 40%, purely nominal; "B" quality, unsalable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *Oct.* 14.

Export inquiries are more numerous, and prices are well maintained in most departments.

Crude gas-works tar.—The actual value is 40s. to 45s. per ton *ex* works.

Pitch.—Export price is nominal at 70s. per ton f.o.b. Glasgow, but there is little interest. Home trade orders command 70s. per ton *ex* works in bulk.

Refined tar to Ministry of Transport specification is offered at round 3¼d. per gallon f.o.r. in bulk.

Creosote oil remains scarce in this district and prices are firm. B.E.S.A. specification is 3d. to 3½d. per gallon; low gravity, 3d. to 3¼d. per gallon; and neutral oil, 3d. to 3¼d. per gallon—all in bulk *ex* works.

Cresylic acid is unchanged during the week. Pale, 97/99%, is 11d. to 1s. per gallon dark, 97/99%, 9d. to 10d. per gallon; and pale, 99/100%, 1s. 2½d. to 1s. 3½d. per gallon—all f.o.r. in buyers' packages.

Crude naphtha.—There is a steady demand for available supplies at 4¼d. to 4¾d. per gallon *ex* works in bulk, according to quality and quantity.

Solvent naphtha.—90/160 grade is 1s. 4d. per gallon, and 90/190 heavy is 1s. per gallon.

Motor benzole.—Value is nominal at 1s. 5d. per gallon.

Pyridines.—90/160 grade is 3s. 3d. to 3s. 6d. per gallon, and 90/140 grade 3s. 6d. to 3s. 9d. per gallon.

Benzole Prices.

These are considered to be the market prices for benzole at the present time:

	s. d.		s. d.	
Crude benzole . . .	0 9	to	0 9½	per gallon at works
Motor ,, . . .	1 4	,,	1 4½	,, ,, ,,
Pure ,, . . .	1 7½	,,	1 8	,, ,, ,,

Trade Notes.

Smiths' Hearths and Blowing Fans.

We have received from Messrs. James Keith & Blackman Co., Ltd., of 27, Farringdon Avenue, E.C. 4, a copy of their catalogue dealing with smiths' hearths and small electric blowing fans.

Cochranes (Middlesbro'), Ltd.

This firm, who manufacture cast iron and centrifugally made iron pipes, have opened an Office in London at 11, Arundel Street, Strand, W.C. 2, and have appointed Mr. E. M. Gill to be Sales Representative in London and the South.

Contract for Gas Compressors.

Messrs. George Waller & Son, Ltd., of Phœnix Ironworks, Stroud, Gloucestershire, have been entrusted with a contract from the Wharncliffe Silkstone Colliery Company for the installation of gas compressors for their coke oven and bye-product plant, to supply coke oven gas to the South Yorkshire Grid and also to the Elsecar Gas-Works. The compressors are of Messrs. Waller's standard type, vertical high-speed reciprocating duplex totally enclosed model, designed for working against a maximum discharge pressure of 20 lbs. per sq. in.

Gas Companies' Results.

Deal and Walmer.

Moving the adoption of the Report and Accounts at the General Meeting of the Deal and Walmer Gas Company, the CHAIRMAN, Sir David Milne-Watson, said that during the year there had been a slight decrease in the sale of gas. This amounted to 1¼% as compared with the previous year, notwithstanding a continued increase in the number of consumers and a consistent output of new apparatus. The decrease, therefore, must be attributed to the weather conditions, which had not been favourable towards the sale of gas, and possibly to the general depression. Sir David remarked that it might not be fully realized by the stockholders that every ton of coal brought into the gas-works incurred a charge, known as the Street Duty, of 1s. 6d. per ton, which had to be paid to the Deal Corporation. This in the aggregate meant something like £800 or £900 per annum, and it appeared to be unfair, inasmuch as neither of their principal competitors, electricity and oil, bore any such charge, and to that extent an advantage was enjoyed over the gas supply whether required for private or public purposes. The duty accounted for more than 1d. per 1000 c.ft. in the price of gas. The Directors recommended dividends for the June half-year at the same rate as for the corresponding period in 1932—namely, 6½% per annum on the preference stock and 7⅜% per annum on the ordinary stocks. This would leave a balance of £221 to be carried forward

STOCK AND SHARE LIST.

Official Quotations on the London and Provincial Stock Exchanges.

Issue. £	Share.	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations. Oct. 14. (Provincial Exchanges Oct. 13.)	Rise or Fall on Week.	Transactions. Lowest and Highest Prices During the Week.
1,551,868	Stk.	Oct. 9	7	7	Alliance & Dublin Ord. ...	120—130*	−2	...
374,000	,,	July 10	4	4	Do. 4 p.c. Deb. ...	85—95	...	...
557,655	,,	Aug. 28	7	7	Barnet Ord. 7 p.c.	165—170	...	...
300,000	1	May 8	1/4⅜	1/9⅜	Bombay, Ltd.	25/—27/-	...	26/6
178,280	Stk.	Aug. 14	9½	9½	Bournemouth sliding scale	192—202	...	...
550,050	,,	,,	7	7	Do. 7 p.c. max. ...	163—168	...	...
439,160	,,	,,	6	6	Do. 6 p.c. Pref. ...	135—140	...	...
50,000	,,	June 26	3	3	Do. 3 p.c. Deb. ...	74—79	...	...
162,025	,,	,,	4	4	Do. 4 p.c. Deb. ...	100—105	+1	102⅝
210,000	,,	,,	5	5	Do. 5 p.c. Deb. ...	120—125	...	...
357,900	,,	Aug. 28	7½	7½	Brighton, &c. 6 p.c. Con. ...	157—167	...	165—167
540,000	,,	,,	6¼	6¼	Do. 5 p.c. Con. ...	144—149	...	...
195,500	,,	,,	6	6	Do. 6 p.c. B Pref.	134—139	...	...
1,487,500	,,	July 24	5	5	Bristol 5 p.c. max.	112—113a	...	...
190,420	,,	June 26	4	4	Do. 1st 4 p.c. Deb. ...	99—101a	...	...
217,870	,,	,,	4	4	Do. 2nd 4 p.c. Deb. ...	99—100a	...	...
328,790	,,	,,	5	5	Do. 5 p.c. Deb.	121—123a	...	...
855,000	,,	Sept. 25	8	7	British Ord.	158—163	+5	162
100,000	,,	June 26	7	7	Do. 7 p.c. Pref.	145—150	...	...
350,000	,,	,,	5½	5½	Do. 5½ p.c. Pref. ...	108—113	...	...
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb. ...	94—99	...	...
450,000	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	103—113	...	...
160,000	,,	June 26	5	5	Cambridge 5 p.c. Deb. ...	115—120	...	...
100,000	10	May 22	6	4	Cape Town, Ltd.	7—8	...	7⅞—7⅞
100,000	10	Apl. 24	4½	4½	Do. 4½ p.c. Pref. ...	7—8	...	7⅞
150,000	Stk.	June 26	4½	4½	Do. 4½ p.c. Deb. ...	95—100	+2	95
626,860	,,	July 24	6	6	Cardiff Con. Ord.	117—122	...	...
237,860	,,	June 26	5	5	Do. 5 p.c. Red. Deb.	105—110	...	...
157,150	,,	Aug. 14	6⅜	5	Chester 5 p.c. Ord.	105—110b	...	...
98,936	1	Oct. 9	2/-	2/-	Colombo, Ltd. Ord.... ...	1⅞—1⅞e	+⅛	...
24,500	1	,,	1/4½	1/4½	Do. 7 p.c. Pref. ...	18/6—20/6*	...	...
609,204	1	Oct. 9	/11 48	/11 48	Colonial Gas Assn. Ltd. Ord	17/6—20/-*	...	19/—20/9
296,053	1	,,	1/3'30	1/3'30	Do. 8 p.c. Pref.	22/—24/-*	—/9	...
1,796,955	Stk.	July 24	6¼	5	Commercial Ord.	120—125	+2	...
475,000	,,	June 12	3	3	Do. 3 p.c. Deb. ..	74—79	...	77
265,272	,,	Mar 6	—	5	Do. 5 p.c. Deb. ..	120—125	...	121—121⅜
807,560	,,	Aug 14	7	7	Croydon sliding scale ...	147—152	+2	149—152
469,590	,,	,,	5	5	Do. max. div.	103—108	...	105—106½
500,000	,,	July 10	5	5	Do. 5 p.c. Deb.	120—125	...	...
542,270	,,	Mar. 6	7	10	Derby Con.	155—165c	...	...
55,000	,,	July 10	4	4	Do. 4 p.c. Deb.	93—98c	...	110
209,000	,,	Aug. 28	5	5	East Hull Ord. 5 p.c. ...	108—113	...	...
179,500	,,	Aug. 28	6	6	East Surrey Ord. 5 p.c. ...	127—132	...	...
155,019	,,	June 26	5	5	Do. 5 p.c. Deb. ...	117—122	...	...
1,009,180	,,	Sept 25	17	15	European, Ltd.	140—145	...	140—142
19,373,992	,,	Aug 14	5⅝	5⅝	Gas Light & Coke 4 p.c. Ord.	27/6—28/6f	+·/9	27/6—28/3
2,600,000	,,	,,	8½	8½	Do. 8½ p.c. max.	84—87	+1	85½—86½
4,477,106	,,	,,	4	4	Do. 4 p.c. Con. Pref. ...	101—104	+1	102—103
6,102,497	,,	June 12	3	3	Do. 3 p.c. Con. Deb. ...	80—83	+1	81—82½
3,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	115—118	...	116½—118
3,500,000	,,	,,	4½	4½	Do. 4½ p.c. Red. Deb. ...	112—116	...	113½—114½
270,466	,,	Aug. 28	6	6	Harrogate New Cons. ...	120—125	...	...
82,500	,,	Aug. 28	7	7	Hastings & St. L. 5 p.c. Conv.	141—146	...	...
258,740	,,	,,	5½	5½	Do. 3½ p.c. Conv.	111—116	...	...
140,000	1	Oct. 9	110	1/7½	Hongkong & China, Ltd. ...	31/—33/-*	...	32/-
218,200	Stk.	Aug. 14	6	6	Hornsey Con. 6½ p.c. ...	120—125	...	...
5,600,000	,,	May 22	10	14	Imperial Continental Cap.	212—222	−5	214—223
223,130	,,	Aug. 14	3½	3½	Do. 3½ p.c. Red. Deb.	89—94	...	...
235,342	,,	Aug. 14	8½	8½	Lea Bridge 5 p.c. Ord. ...	167—172	...	...
2,145,907	,,	Aug. 14	6	6	Liverpool 5 p.c. Ord. ...	131½—133½b	+¾	...
245,500	,,	June 26	5	5	Do. 5 p.c. Red. Pref. ...	103—113b	...	...
306,083	,,	July 17	4	4	Do. 4 p.c. Deb. ...	99½—101½b	...	...
165,736	,,	Aug. 28	10	8	Maidstone 5 p.c. Cap. ...	180—190	...	...
56,176	,,	July 10	8	8	Do. 3 p.c. Deb. ...	69—74	...	...
75,000	5	June 12	110	110	Malta & Mediterranean ...	9—11	...	...
393,000	—	Oct. 2	5½	5½	Metropolitan (of Melbourne) 5½ p.c. Red. Deb.	98—103*	...	...
231,978	Stk.	Aug. 28	5	5	M. S. Utility "C." Cons. ...	111—116	...	...
818,657	,,	,,	4	4	Do. 4 p.c. Cons. Pref.	92—97	...	...
112,126	,,	June 26	4	4	Do. 4 p.c. Deb. ...	100—102	...	...
148,955	,,	,,	5	5	Do. 5 p.c. Deb. ...	118—118	...	...
675,000	,,	21 May '31	16	16	Montevideo, Ltd.	62—72	+9	65½—67
2,061,315	,,	Aug. 14	5⅝	5	Newcastle & Gateshead Con.	25/—26/-d	...	...
682,856	,,	,,	4	4	Do. 4 p.c. Pref. ...	99—100d	...	...
776,706	,,	July 10	3½	3½	Do. 3½ p.c. Deb. ...	91—93d	...	...
377,385	,,	May 8	5	5	Do. 5 p.c. Deb. '43...	107—109d	...	...
274,000	,,	Aug. 14	5	5	Newport (Mon.) 5 p.c. max.	100—102a	...	...
304,940	,,	Aug. 28	7½	7½	North Middlesex 6 p.c. Con.	144—152	...	...
396,160	,,	Aug. 14	5	5	Northampton 5 p.c. max. ...	101—106	...	...
300,000	,,	Apl. 24	9	7	Oriental, Ltd.	114—119	...	...
316,617	,,	June 26	8	8	Plym'th & Stonehouse 5 p.c.	167—172	+1	171
504,416	,,	Aug. 28	8	8	Portsm'th Con. Stk. 4 p.c. Std.	162—167	...	...
241,446	,,	,,	5	5	Do. 5 p.c. max. ...	102—107	...	...
114,000	,,	Aug. 14	5	5	Preston 5 p.c. Pref.	101—106	...	...
686,812	,,	July 24	4	4	Primitiva 4 p.c. Rd. Db. 1911	86—91	...	...
389,813	,,	June 26	4	4	Do. 4 p.c. Cons. Deb.	82—87	...	...
150,000	10	Sept. 25	6	6	San Paulo 6 p.c. Pref. ...	6½—7½	...	6⅞—6⅞
1,736,968	Stk.	Sept. 11	6	6	Sheffield Cons.	129—133e	...	...
95,000	,,	July 10	4	4	Do. 4 p.c. Deb.	90—94e	...	...
133,201	,,	Sept. 11	5	8¾	Shrewsbury 5 p.c. Ord. ...	132—137	...	...
90,000	10	June 12	15	14	South African	3—5	...	...
6,709,895	Stk.	Aug. 14	7	5	South Met. Ord.	131—136	+1	132—136
1,135,812	,,	,,	6	6	Do. 6 p.c. Irred. Pf.	135—140	...	138
850,000	,,	,,	20/-g	4	Do. 4 p.c. Irred. Pf.	100—103	+½	101½—103
1,895,445	,,	July 10	3	3	Do. 3 p.c. Deb. ...	79—82	+2	80—82
1 000,000	,,	July 24	5	5	Do. 5 p.c. Red. Deb.	112—116	...	114½—115½
209,820	,,	Aug. 14	8½	8½	South Shields Con.	171—173d	...	...
1,543,795	,,	Aug. 14	6	6	South Suburban Ord. 5 p.c.	127—132	+1	128—131
300,000	,,	,,	5	5	Do. 5 p.c. Pref.	112—117	...	115
300,000	,,	,,	—	4	Do. 4 p.c. Pref.	100—103	+½	101¼—102½
868,337	,,	June 26	5	5	Do. 5 p.c. Deb.	118—123	...	121½—123
100,000	,,	,,	—	—	Do. 4 p.c. Deb.	102—105	...	...
647,740	,,	Aug. 28	5	5	Southampt'n Ord. 5 p.c. max.	107—112	...	110—110½
121,275	,,	June 26	4	4	Do. 4 p.c. Deb.	99—104	...	...
350,000	,,	Aug. 28	5½	5½	Swansea 5½ p.c. Red. Pref.	107—111	...	108½
200,000	,,	June 26	6½	6½	Do. 6½ p.c. Red. Deb.	103—108	...	108
1,076,490	,,	Aug. 14	6½	6½	Tottenham and District Ord.	146—151	...	151
300,000	,,	,,	5½	5½	Do. 5½ p.c. Pref. ...	121—126	...	...
62,285	,,	,,	5	5	Do. 5 p.c. Pref. ...	112—117	+4	...
199,005	,,	June 12	4	4	Do. 4 p.c. Deb. ...	98—103	...	100—101
85,701	,,	Oct. 9	6	6	Tuscan, Ltd., 6 p.c. Red. Db.	90—100*	...	...
347,769	,,	Aug. 28	7	7	Uxbridge, &c., 5 p.c. ...	144—149	...	...
88,330	,,	,,	5	5	Do. 5 p.c. Pref. ...	112—117	+2	...
1,322,220	,,	July 10	7	7	Wandsworth Consolidated	152—157	+1	154½—156½
1,096,373	,,	,,	5	5	Do. 5 p.c. Pref.	116—121	+1	118—120
1,317,964	,,	June 26	5	5	Do. 5 p.c. Deb.	118—123	...	...
158,400	,,	Aug. 28	6⅛	5	Winchester W. & G. 5p.c. Con.	107—112	...	...

Quotations at:—*a.*—Bristol. *b*—Liverpool. *c.*—Nottingham. *d.*—Newcastle. *e.*—Sheffield. *f*—The quotation is per £1 of stock. *g*—For quarter. *h*—Paid £3, including 10s. on account of back dividends. *i*.—The interest due 1/7/33 was paid on that date. * Ex. div. † Paid free of income-tax ‡ For year. Hongkong & China, Ltd.—paid on £10 shares

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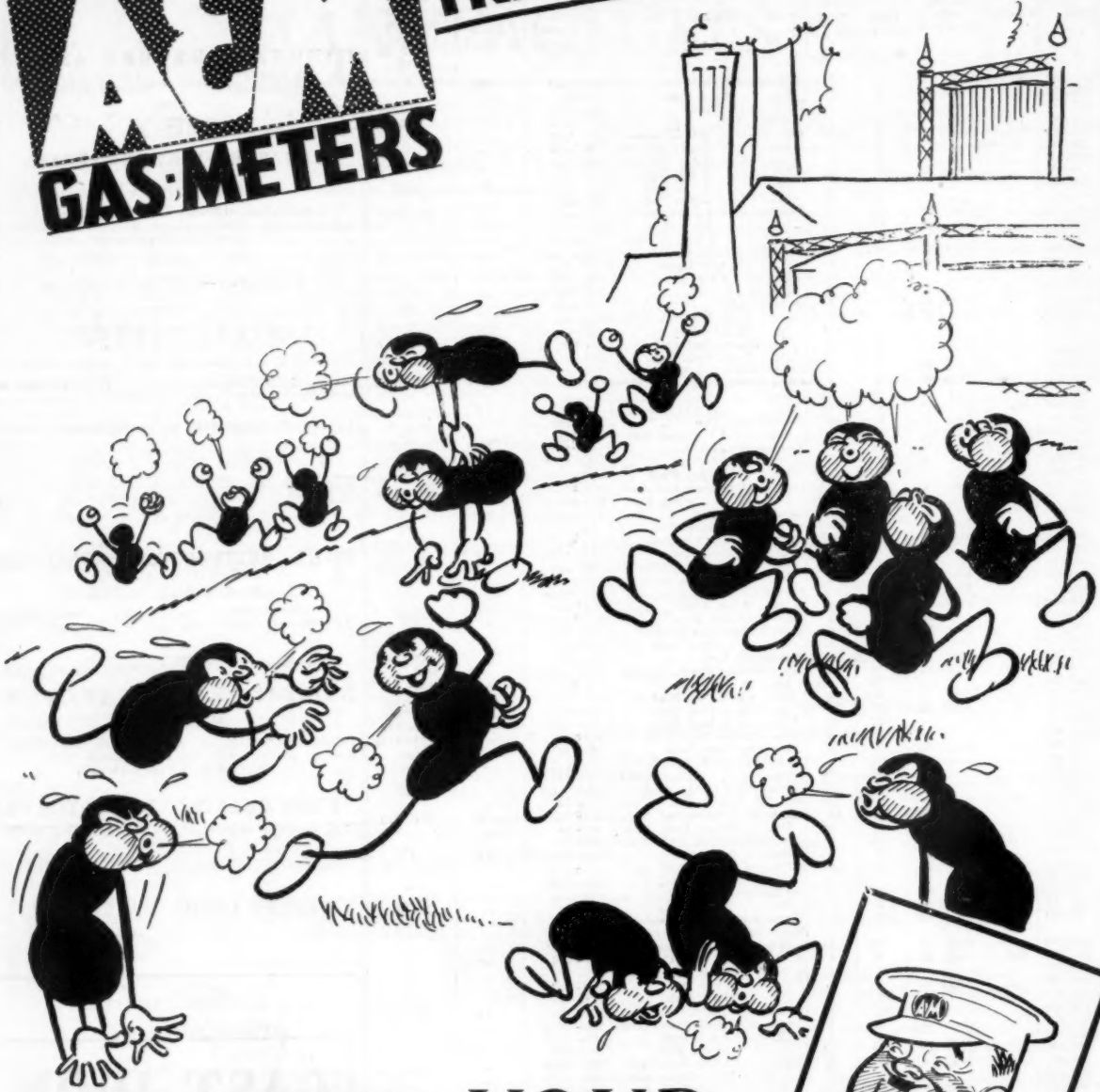

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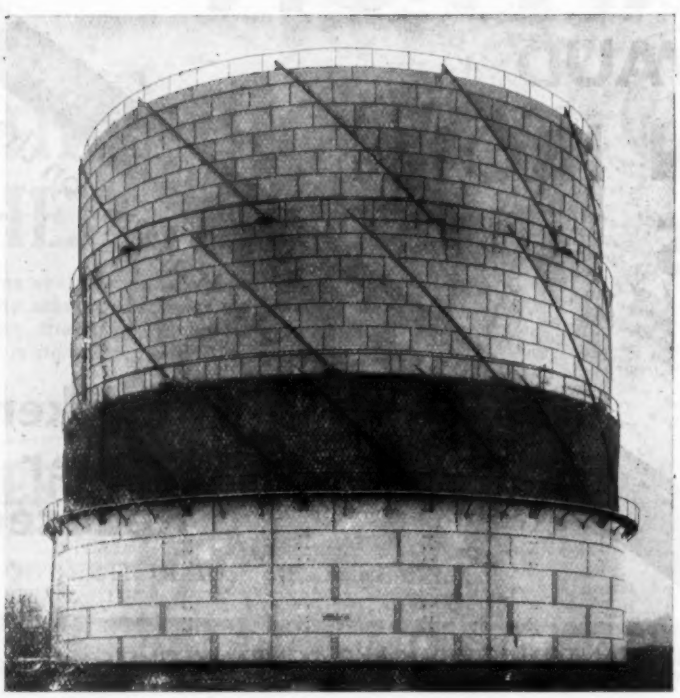

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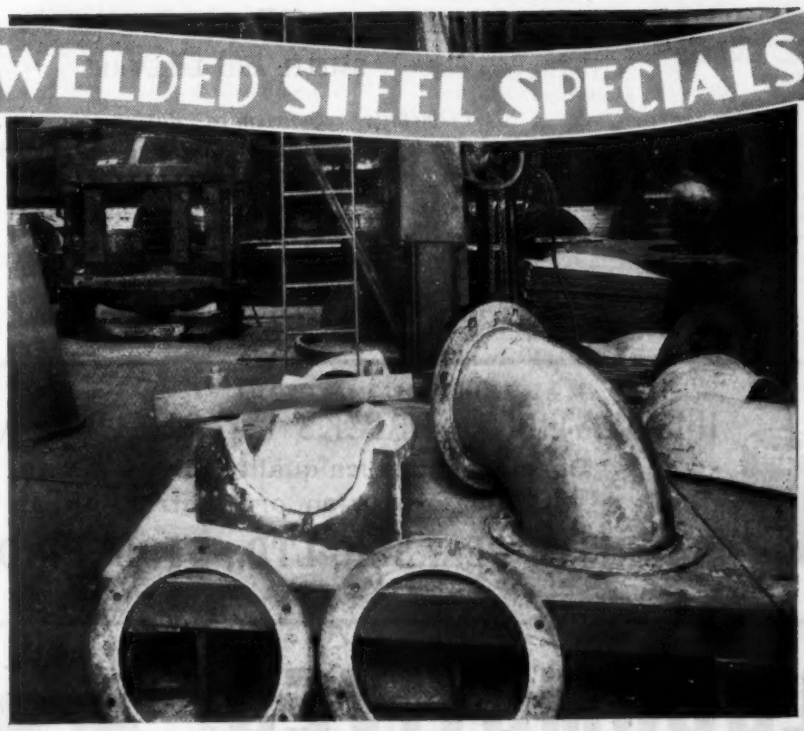

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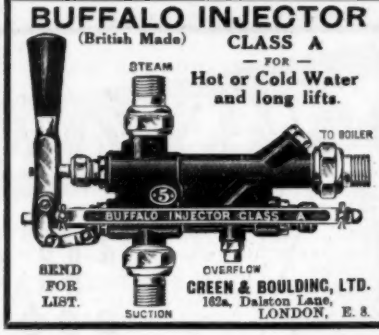

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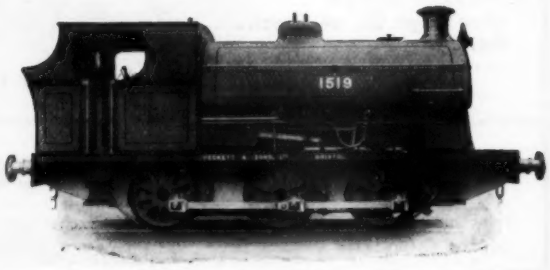

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